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THE IRON TRADE REVIEW

VOLUME XXXIII. CLEVELAND, O. OCTOBER 25, 1900. CHICAGO, ILL. NUMBER 43

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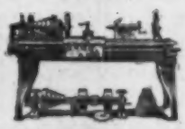
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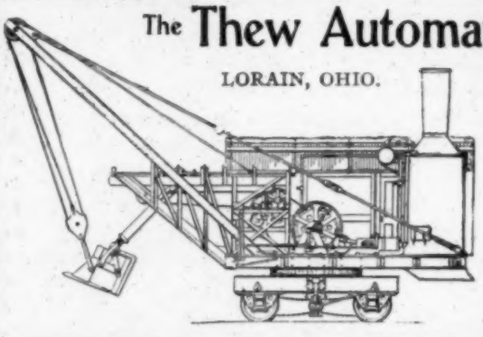
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THE IRON TRADE REVIEW

VOLUME XXXIII. CLEVELAND, O. OCTOBER 25, 1900. CHICAGO, ILL. NUMBER 43

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

With the election so close at hand it might be assumed that buying of iron and steel would wait on the actual announcement of the result. As a matter of fact there has been an active market in the past week, finished material being in largest demand, while pig iron in some selling centers has been more active than in recent weeks. The placing of contracts with the proviso that they may be canceled in case the election result is unfavorable to business, or more specifically, is against the administration, has been a feature of the week's business. Many buyers, also, satisfied of the election outcome, are evidently placing their orders in the belief that demand will increase promptly on the announcement of the result and that the result on some materials, at least, will be higher prices. Plates have been advanced $1 to $3 a ton by Pittsburg mills, in view of the heavy sales of the past few months, and steel bars are firmer, one producer being for the present out of the market. The rail situation has not been altered materially. The week has brought further orders, the total of standard sections being now estimated at 400,000 tons, but the majority of buyers are still waiting, and some of them are further protesting against the price. Foreign orders continue to be a factor, several good lots being taken in the week. Sales of light rails also amount to a considerable total. The disparity between the prices of rails and billets has been lessened by an advance in the latter. Sales at $17.50 and $18 Pittsburg are reported and some large business is pending. It is a significant indication of the change that is coming over the situation through the increased activity of finishing mills, that shipments of Bessemer iron from one merchant furnace have been resumed after being held up for months. Further relief has come to furnace interests through the revision of high-priced coke contracts. Sales of Bessemer iron are still restricted, and the business is chiefly with malleable concerns. Though the Bessemer Association is not considering new business with steel companies on the present basis, low prices continue to be reported on malleable Bessemer, one sale of 2,000 tons having been made the past week at $12.50 at furnace. For non-Connellsville coke $1.50 is the basis of late contracts and $1.75 for Connellsville. Pittsburg reports more activity in foundry iron than for weeks. From other centers reports show that foundry buyers are insisting on bottom prices where they contract for two or three months ahead, and in some cases they have succeeded in establishing a new low point. Northern sellers are still below the lowest prices made by Southern furnaces. Not a few of the latter are making no attempt to meet quotations current in some sections. The haste of some furnacemen to dispose of iron made from high-priced ores before the coming in of the 1901 basis of cost is opposed by the holding aloof of others who see a chance of better prices immediately after the election. From the view point of the mills the situation is certainly better than at any time in the year. The trade is at one in its expectations of next year's business. Just what turn the market will take in the mid-winter months, with the large capacity of modern plant now available is the undetermined question. The outcome in rails will go far toward settling it. Foreign markets continue to weaken. In England buyers are holding off and, as on this side while the decline was in progress, lower prices do not beget business. However, there is still a profit in export business in all iron and steel lines, in spite of high ocean freights.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Oct. 23.

Ante-election depression predicted and expected by many was an unknown quantity in the local iron and steel market in the past week. If anything the market was livelier than it has been in months. Not only has finished material been in excellent demand, but unfinished products as well shared the era of prosperity Prices on all finished lines, while not generally higher, are much firmer, and a brief continuance of this demand will doubtless result in advances. In raw material, foundry irons lead. The foundrymen of this district appear to realize that prices have been ruling extremely low and they have taken advantage of them to the extent of placing orders until the first of the year. The pig iron producers refused to quote prices for delivery beyond January, although requested to do so in several instances. Small lots of Bessemer iron were placed at prevailing prices, and the limited demand for this product was the only noticeable weak spot in the entire market. Steel billets here sold in round lots and the largest producers have advanced their prices to $17.50 and $18 per ton. It is probable that a considerable tonnage will be placed before the end of the week by Eastern mills that have made inquiries for 1,000 and 2,000 lots for delivery within two and three months. In finished lines, plates, bars and structural material are most active. Plates have sold at 1.05c for desirable orders, although we are advised that a leading mill has advanced the price to 1.15c within the last few days, and 1.25c is asked on small-lot business. One of the largest producers of steel bars in this district is practically out of the market owing to the large tonnage already booked, but desirable orders can still be placed at 1.15c. There has been a good demand for structural material during the past week, and while prices remain unchanged they are much firmer. A considerable tonnage is being placed in light rails, ranging in weight from 16 to 20 pounds, several round lot orders having been placed by coal operators. An order for 10,000 tons of steel rails for shipment to Java was placed with the Carnegie Steel Co., and it is reported that a number of other rail orders have been placed with this concern recently for foreign shipment. The foreign orders for pipes, tubes and castings is unprecedented, while the domestic demand is equal to that of the corresponding period last year, which was the largest in the history of the trade. One of the valley furnaces during the past week resumed shipment of Bessemer iron from stocked iron, to one of the large steel companies on a con-

tract. Considerable $24 iron still remains to be taken, but thus far only one interest has requested the resumption of shipments, which were stopped some months ago. It is learned that the coke manufacturers have been making concessions to furnace interests tied up on high-priced contracts. It is stated that several furnaces will resume shortly, owing to the fact that a better price has been made them on coke for the remainder of the year.

PIG IRON.—It is conservatively estimated that sales of foundry and forge iron made to local interests during the past week will aggregate 10,000 tons. The foundrymen of this district who have been holding off for months and who have been buying for immediate consumption only came into the market and placed contracts extending to the first of the year. Although prices were not the best, from a furnaceman's standpoint, it has taken iron out of the market, which has served to bear prices up to date. A small tonnage of No. 2 foundry was placed at $13.50, although the major portion of the iron was sold at prices ranging from $13.75 to $14. We also note the sale of 2,500 tons of forge iron at $12.50, Pittsburg. Mill iron in the valleys is held at $12, although we have not been advised of any sales during the week. There has been little doing in Bessemer iron which continues to be held at $13 25 and $13.50, Pittsburg. Small lots were sold at these prices at furnaces in this district. The valley furnacemen refuse to make quotations while these low prices prevail, and have made no sales during the week in consequence. A large buyer of Bessemer for malleable purposes is reported in the market, but up to this writing has not yet closed. One of the valley furnaces resumed shipment of Bessemer in stock to a large steel company during the past week. This iron was contracted for at $24 per ton. A number of other interests that have a considerable tonnage coming to them from valley furnaces, placed at high prices, have not requested the resumption of shipments, ordered stopped several months ago. We revise our quotations as follows:

Bessemer Valley	$13.25
Bessemer, Pittsburg	13.25 to $13.50
No. 1 Foundry	14.25 to 14.50
No. 2 Foundry	13.50 to 14.00
No. 3 Foundry	13.50
Gray Forge, Pittsburg	12.50 to 12.75

STEEL.—A considerable tonnage of billets has been taken out of the market during the past few weeks, owing to the extreme activity on the part of local mills, and this coupled with a good demand has resulted in an advance in price. We note the sale of 1,000 tons of Bessemer billets, at mill, at $18 per ton, and several other 1,000 ton lots were sold at $17.50 per ton during the past week. In addition there are a number of inquiries on hand from large Eastern buyers, and it is probable that these orders will be closed before the end of the week. We quote steel billets, 4x4, at $17.50 to $18 at mill, and sheet bars, long lengths, at $21 at mill. Light tin bars are held at $22.50 to $23 at mill.

FERRO-MANGANESE.—The largest producer continues to quote $75 per ton for domestic, 80 per cent.

RAILS AND TRACK MATERIAL.—There has been considerable demand from abroad, and one contract for 10,000 tons for shipment to Java, subject to ratification by the Dutch government, was placed with the Carnegie Steel Co. It is further reported that a number of other contracts for foreign shipment were closed here. Despite the attempt to bear the market rail prices remain unchanged, and with the price of billets advancing there is less probability of concessions being made. While none of the large buyers of rails have been in the market during the past week, it is reported that contracts for lots of several thousand tons were placed with the Carnegie Steel Co. and the Cambria Steel Co. The demand for light rails continues and several orders for shipment within the next two months were placed with a local producer during the week. We make the following quotations: Rails, standard sections, 50 pounds and over, in lots of 200 tons and over, $26; car lots and less than 200 tons, $28; less than car lots, $30; 16 to 25 pound rails, $28; 25 to 50 pounds, $25. Track material: Spikes, 1.75c to 1.85c; track bolts, square heads, 2.25c; hexagon heads, 2.35c; fish plates, 1.40c to 1.50c.

SPELTER.—The spelter market has been somewhat firmer during the past few days and best Western grades are held at 4.15c to 4.20c, Pittsburg.

MUCK BARS.—Very little muck iron for the market is being produced here at the present time. One of the largest plants is kept idle owing to the low prevailing prices. Small lots have sold at $24.50 to $24.75 during the week.

SKELP.—Demand for iron skelp is somewhat better but it is by no means all that can be desired. Both grooved and sheared iron skelp are held at 1.47½c to 1.50c. Steel skelp, both grooved and sheared is held at 1.35c.

BARS.—A large local producer of steel bars is temporarily out of the market owing to the heavy tonnage already on hand. Other interests refuse to quote less than 1.15c, while an important Western Pennsylvania mill represented here refused to make better than 1.25c, Pittsburg. A considerable tonnage was placed during the week and the indications are that prices will continue firm for some time, if they are not advanced. The demand for common iron bars is increasing and considerable business was placed during the past few days. We quote common iron bars at 1.35c, Pittsburg, and refined bars at 1.65c to 2c.

PLATES.—Considerable business in tank plate was placed during the week and one mill, owing to the large tonnage already booked, refuses to make any quotations below 1.15c. Another local interest will only quote 1.05c on a large and desirable order and small orders are taken at 1.10c to 1.15c. Shell steel is held at 1.20c and flange at 1.25c. Some grades of fire-box are being offered here at 1.50c, although one of the largest producers continues to ask from 2c to 3c.

SHEETS.—The leading independent sheet mill in this district reports business exceedingly good, with contracts booked that will keep the mill in operation for several months. The consolidation reports an excellent demand on both black and galvanized sheets. No. 28 gauge black sheets, one pass through cold rolls, are quoted at 2.80c and No. 27 gauge at 2.70c. No. 26 is held at 2.60c, No. 24 at 2.50c; No. 20 at 2.40c, No. 18 at 2.20c to 2.25c; No. 16, 1.90c to 2c; No. 14, 1.60 to 1.70c; Nos. 11 and 12, 1.45c to 1.55c, and No. 10, 1.30c to 1.35c. Galvanized sheets are quoted 75 off with the customary 15-cent freight allowance.

STRUCTURAL MATERIAL.—An excellent demand continues for all kinds of structural material. The large amount of bridge building that is being done by the railroads, and which will be done in the next six months, is keeping the structural mills in this district comfortably filled with orders. Prices remain unchanged as follows: Beams and channels, 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees, 1.55c; zees, 1.50c; angles, from 3 to 6 inches, 1.40c. Universal mill plates, 1.10c to 1.15c, according to delivery and size of order.

PIPES AND TUBES.—The demand for foreign shipment for pipes, tubes and casings is excellent. The domestic demand is so great that the largest producer is gradually placing all its idle mill capacity into operation. Prices remain unchanged: Discounts to consumers in carload lots, Pittsburg, are as follows:

MERCHANT PIPE.

	Black. per cent.	Galvd. per cent.
⅛ to ⅜ inch and 11 to 12 inch	61	48
½ to 10 inch	68½	56

BOILER TUBES.

	22 Feet and under. Per cent.		Over 22 Feet. Per cent.	
	Iron.	Steel.	Iron.	Steel.
1 to 1⅜ and 2¼ inches	49½	55	44½	50
1½ to 2¼ inches	45	51	39½	46
2½ to 13 inches	57	62	52½	58

CASING.

	S. and S., per cent.
2 to 3 inches	58
3½ to 4 inches	63
4½ to 12½ inches	65

O. D. PIPE.

	Per cent.
14 to 22 inches	42
24 inches, o. d. and larger	37

THREADS AND COUPLINGS.

	Per cent.
14 to 16 inches, o. d.	35

MERCHANT STEEL.—Business in merchant steel is fair especially in small lots. Prices remain unchanged as follows: Tire steel in carload lots and over at 1.25c; less than carload lots, 1.35c. Toe-calk is held at 1.30c to 1.40c in large lots and in small lots as high as 1.50c is asked. Tool steel is held at 7c and upward according to quality.

WIRE AND WIRE NAILS.—Jobbers report a good demand for wire and wire nails, with only a fair demand for cut nails. Prices are unchanged as follows: Single carloads of wire nails to jobbers, $2.20, Pittsburg; to retailers, $2.30. Plain

wire, carload lots, is quoted at $2.15 to jobbers and $2.25 to retailers; painted barb wire, $2.50 in carload lots to jobbers and $2.60 to retailers; galvanized barb wire, $2.80 in carload lots to jobbers and $2.90 to retailers. Cut nails are held at $1.95, Pittsburg, in carload lots with 2 per cent off in 10 days.

OLD MATERIAL.—The call for old iron rails is greater than the present avalabile supply, and as high as $18 has been paid per ton during the past week for small lots. Some of the old material dealers are beginning to come to the conclusion that the iron rail supply is really near its end, although this has been predicted so often that no one dare take the responsibility of such a prediction for the immediate future. In other lines the market is quiet. We revise quotations as follows: New Bessemer melting stock, $12 50 to $13, gross tons; old iron rails, $17 to $18; busheling scrap, $11 to $12; cast borings, $5 to $5.50; cast scrap, $13 to $14; steel rails, mixed lengths, $12 50 to $13, and short lengths $13 to $14.

COKE.—We have been advised that a number of the coke producers have made concessions to furnace operators on contracts closed at high prices. The contracts provide that the coke operators furnish coke while the furnace is in operation. When the furnaces are shut down the coke operators suffer and many concessions on high-priced contracts have resulted. Coke not strictly Connellsville has been sold on contract at $1.50 per ton, while some of the Connellsville product has been sold at $1.75 per ton. Foundry coke, not strictly Connellsville, is held at $2 to $2 25, while Connellsville is quoted $2.25 to $2.50. For the week ending Oct. 13, the production fell off 12,590 tons from that of the previous week, despite the fact that more ovens were in operation.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1512 MONADNOCK BLOCK, Oct. 23.

The market continues in a waiting condition. While there are a large number of buyers in the market inquiring for prices on nearly all kinds of iron and steel, buying as a rule is limited to comparatively small lots, and sellers do not look for any very great increase in the tonnage of sales between now and election day. There seems to be little doubt, however, that with the success of the administration at the polls an exceedingly large tonnage of business will be placed within the next few weeks thereafter. It is possible, too, that some buyers will discount the result and place their orders before election, hoping thereby to secure better prices than may prevail afterwards. As a rule, however, consumers are not expected to do any large buying between now and then.

PIG IRON.—Inquiries for over 50,000 tons of iron are in the market now, and buyers are doing their best to secure low prices on their requirements. It is hardly expected much of this tonnage will be placed before election, but it is thought that most of it will be contracted for within three or four weeks thereafter. Buying at the present moment is confined to comparatively small lots, as consumers, as a rule, prefer to wait until election results are known before making any large contracts. Sales in the last week have not been as large as were those of the week previous, and did not include any important transactions. Most furnace representatives claim to be securing full prices, but it is true nevertheless that many transactions have been closed at figures under those we give. Prices are a shade lower than a week ago, and our quotations can be bettered for large and desirable business. It is thought by many sellers that prices will be stronger in the event of Republican success at election, as buying will then be materially increased. Quotations are now about as follows:

Lake Sup. Charcoal	$17 50 @ $18 00	Southern Coke No. 4	$13 00 @ 13 50
Local Coke Fdy. No. 1	15 00 @ 15 50	Southern No. 1 Soft	15 00 @ 15 50
Local Coke Fdy. No. 2	14 00 @ 15 00	Southern No. 2 Soft	14 00 @ 14 50
Local Coke Fdy. No. 3	13 50 @ 14 50	Southern Silveries	15 50 @ 16 50
Local Scotch Fdy. No. 1	15 00 @ 15 50	Jackson Co. Silveries	18 00 @ 20 00
Local Scotch Fdy. No. 2	14 00 @ 15 00	Ohio Strong Softeners	15 80 @ 16 30
Local Scotch Fdy. No. 3	13 50 @ 14 50	Alabama Car Wheel	20 30 @ 20 80
Southern Coke No. 1	15 00 @ 15 50	Malleable Bessemer	14 50 @ 15 00
Southern Coke No. 2	14 00 @ 14 50	Coke Bessemer	14 50 @ 15 00
Southern Coke No. 3	13 50 @ 14 00		

BARS.—There has been quite a good demand, and actual transactions were for a considerable tonnage, mostly in small lots, although a few quite large contracts were placed. The market is not especially strong, but mills have made no changes in quotations, which are 1.30c to 1.35c for steel and 1.35c to 1.40c for iron, half extras, Chicago delivery.

STRUCTURAL MATERIAL.—Little important business was closed in the week. Sales were all for small lots, and while there is a considerable tonnage which it is thought will be placed soon, it is not expected contracts will be closed for three or four weeks. The market is unchanged. Quotations are as follows: Beams, 15 inches and under, 1.65c; 18 inches and over, 1.75c; angles under three inches, 1.40c to 1.45c; over six inches, 1.65c; three inches to six inches, 1.55c; plates, 1.25c to 1.35c; tees, 1.70c; zees, 1.65c; small lots from store are quoted ¼c to ½c higher.

PLATES.—Sales did not include any very important business in the week just closed, most of the orders being for small lots. The market is firmer than it has been of late, but no changes have been made in quotations which are made as follows for mill shipments, Chicago delivery: Tank steel, 1.25c to 1.35c; flange, 1.35c to 1.40c; marine, 1.45c to 1.50c; fire box, 2.25c and up, according to brand.

RAILS AND TRACK SUPPLIES.—Sales of about 20,000 tons of rails were made in this market last week. Other business is in sight, and is expected to be placed within a short time. Quotations are as follows: Rails, standard sections, $26; light sections, $25 to $28; splice bars, 1.40c to 1.50c; spikes, 1.65c to 1.75c; track bolts, hexagon nuts, 2.05c to 2.10c; square nuts, 2c to 2.05c.

SHEETS.—The demand continues good, and several quite large sales have been closed in the week. Both consumers and jobbers are buying, and many of them are placing orders for only their immediate requirements, and buying often. Galvanized sheets are unchanged at 70 and 10 per cent discount, with 18c freight allowance, and black sheets, No. 27, are still quoted at 3.10c to 3.20c.

MERCHANT STEEL.—The market is quiet and unchanged, with not a very large tonnage of orders closed last week. The demand is hardly as good as it was a week or two ago. Quotations are as follows, mill shipments, Chicago delivery: Smooth-finished tire steel, 1.75c to 1.85c; open-hearth spring steel, 2.15c to 2.35c; toe calk, 2.40c to 2.55c; sleigh shoe, 1.70c to 1.80c; cutter shoe, 2.40c to 2.55c; ordinary tool steel, 6c to 7c; specials, 12½c and upwards.

MERCHANT PIPE.—Sales were hardly as large last week as they were in the week previous but still were fair, and included in the business were one or two contracts for round lots. Random lengths are quoted as follows:

MERCHANT PIPE.

	Carload lots.		Less than carload lots.	
	Black Per cent.	Galv. Per cent.	Black Per cent.	Galv. Per cent.
¼ to ½, and 11 to 12 in.	59.2	46.2	54.9	40.9
¾ to 10 inches	66.7	53.3	61.9	48.9

WIRE AND WIRE NAILS.—The demand has been most excellent, and fully as large as during any week of the year. Sales were nearly if not quite up to the record, and give promise of continuing large indefinitely. Makers quote single carloads of wire nails at $2.48 f. o. b., Chicago, and $2.63 for less than carloads. On wire, current quotations are as follows: Plain annealed wire, $2.43; painted barb wire, $2.78; galvanized barb wire, $3.08.

OLD MATERIAL.—A few good orders were closed in the week, including one of 1,200 tons and one of 600 tons. Other business was small and dealers do not look for any immediate increase in the demand. Railroad offerings are not large, and they seem to be holding off for higher prices. There is some demand for old iron rails, but no very large sales were made last week. Mills have been buying only in comparatively small lots. Dealers' selling prices are as follows, per gross ton:

Old iron rails	$16 00 @ $16 50	Country malleable	$10 00 @ $10 50
Old steel rails, long	13 00 @ 14 00	Iron axles	19 00 @ 20 00
Old steel rails, mixed	10 00 @ 10 50	Cast borings	4 00 @ 4 50
Relaying rails	20 00 @ 22 00	Wrought turnings	7 00 @ 7 50
Old wheels	16 00 @ 17 00	Iron axle turnings	8 50 @ 9 00
Railroad forge	15 00 @ 16 00	Steel axle turnings	7 50 @ 8 00
Dealer's forge	12 00 @ 12 50	Mixed country steel	8 00 @ 8 50
No. 1 cut mill	10 00 @ 10 50	Stove plates	9 00 @ 10 00
Heavy cast	13 00 @ 14 00	Heavy melting steel	10 00 @ 10 50
Railway malleable	11 50 @ 12 00	Old iron splice bars	16 00 @ 17 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*,
CAXTON BUILDING, Oct. 24.

The lagging ore movement promises to grow less and less. Shippers have been confronted with a new problem in the past several weeks—how to keep contract vessels employed and

at the same time have as few cargoes as possible hauled in a given time. The vessels persist, however, in being ready for sailing orders faster than the ore men can take care of them. It is believed the October movement will fall below 2½ million tons and that the November total will be 1½ million tons or less, putting the season's total of water shipments between 18,000,000 and 19,000,000 tons. The estimate made in these columns three months ago, when the curtailment movement was in evidence, put the total rather under than over 18,000 000 tons. Indications now are that it may be nearer 19,000,000 than 18,000,000 tons. There will be a goodly number of boats to lay up on Nov. 1. In the last fortnight there have been additional reductions of force at certain mines, in some cases because the season's requirements had been met, in others because the operation of the properties could only be profitable on a boom demand.

PIG IRON.—Two additional merchant furnaces in the Mahoning Valley have gone out of blast, and none of the merchant stacks in either valley, that have been idle for some time, is getting ready for immediate resumption. The sale of Bessemer iron for malleable purposes has kept up at a fairly steady pace. We quote $13 to $13.50 at valley furnace, which is also practically the Pittsburg basis, though the Pittsburg market for Bessemer has shown greater firmness than in the preceding three or four weeks, due as some observers regard it, to the absence of manipulative sales having a bearing on billet contracts. Foundry iron is lower, $12 75 valley furnace being now more commonly quoted for No. 2. Some furnaces are out of it, on this basis, and the theory on which it is presumed others are proceeding is that high-priced ores must be worked off as rapidly as possible and the decks cleared for next year. This is on the supposition that next year's prices will have a close relation to the new costs about which furnacemen already have their ideas. That demand may again carry prices well above the cost mark does not seem to enter into the calculation of those who follow this line of reasoning. As a rule foundry buying is for immediate or early shipment. The local molders' strike gives no indication of early adjustment and meantime the melt of iron in Cleveland foundries is considerably below the normal. Some inquiry has been made in the valleys for basic iron, but forge continues dull. We quote the Cleveland market as follows:

Bessemer, Valley	$13.00@13 50	**Valley Scotch No. 1**	$14 25@14 50
No. 1 Strong Foundry	14 25@14 50	**Valley Scotch No. 2**	13 75@ 14 00
No. 2 Strong Foundry	13 75@14 00	**Gray Forge, valley**	12 00
No. 3 Foundry	13 25@13 50	**Lake Superior Charcoal**	17 50@ 18 00

FINISHED MATERIAL.—An advance in plates is the feature of the week. Sheared plates have been in very heavy demand for many weeks and the mills are now very well supplied. The shipyard contract for 6,000 tons referred to last week was booked subject to cancellation in case of the defeat of President McKinley. It is understood that some vessel business recently placed is conditioned on the election result. We quote plates at 1.15c to 1.25c, Pittsburg, the latter figure being named on ordinary business by the most heavily sold mills. There is a steady run of orders for bars, sheets and plates, from a wide range of consuming interests, and business rather grows than otherwise. There is no change in bar iron, which we quote 1.25c at valley mill, and 1.40c to 1.45c Cleveland out of stock, with half extras. Steel bars are firmly held and 1.20c at Pittsburg mill is now commonly quoted. Structural material is rather quiet. Inquiry is made for the steel for the new McMyler Mfg Co. plant to be erected at Warren, O. From 400 to 500 tons will be required. We continue quotations on sheets as follows: No. 12, 1.60c; No. 18, 2.15c; No. 20, 2.35c. to 2.45c; No. 22, 2.50c; No. 27, one pass through cold rolls, 2.80c; No. 28, 2.90c. Demand for pipe continues good, and prompt deliveries from mill are out of the question. Discounts remain unchanged.

OLD MATERIAL.—Apart from higher prices for old iron rails, of which the limited supply is more and more emphasized, there is little change in the market. The leading bar iron interest has made some purchases recently. We quote the Cleveland market as follows, all prices being for gross tons: Old iron rails, $16.50 to $17; old steel rails, $11.50 to $12.50; old car wheels, $15; No. 1 railroad wrought scrap, $13.50 to $14; mill scrap, $11; No. 1 machine cast scrap, $13; iron axles, $17 to $17.50; wrought turnings, $7.50; cast borings, $4 to $4.50; grate bars, $6.50; stove plate, $7.50; malleable iron, $11.

CINCINNATI.

Oct. 22.

Matthew Addy & Co. comment as follows: "While there have been several round blocks of foundry iron for forward delivery sold this week, yet the bulk of the purchasing has been for short deliveries, 30 to 60 days as a rule. The market has been active and at the present time some very large inquiries are being made. It is a little hard to say whether these will result in real business or not. Certain it is, however, that many of the large consumers will have to buy iron very soon. They may be only feeling the market at the present time, but if they are going to continue to run they will have to buy. The Presidential election has tied up a great deal of business and it is highly probable that when that is safely passed, provided the result is as expected, there will be a buying movement of considerable force and volume."

Rogers, Brown & Co. refer to an increase in activity in pig iron in the past week. They say: "Sales have been more numerous and comparatively of larger tonnage. Inquiries have increased and the general spirit of the trade has been vitalized appreciably. These developments are not surprising to those informed, as it has been known that many consumers have exhausted their pig iron supply and are evidently tired of making almost daily car lot orders. Furthermore, prices have fallen to such a low level that buyers feel greater security in contracting at prices obtainable for any class or character of iron desired. The shrinkage in prices has been so pronounced that some furnaces are distressed as to figures prevailing and are entirely unwilling to meet figures others consent to, though probably as well or better prepared to accept. Everything points to improvement. The election of McKinley and the patriotic sustainment of the present administration seems assured, which if realized will confirm government policies and plans and maintain the safe conservative programme prevailing."

We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $13.75 to $14 75; No. 2, $13.25 to $13.75; No. 3, $12 75 to $13.25; No. 4, $12 to $12 50; gray forge, $11.75 to $12; No. 1 soft, $13 75 to $14.75; No. 2, $13.25 to $13.75; Lake Superior coke, No. 1, $15 to $15.50; No. 2 $14 to $14.50; Hanging Rock charcoal, No. 1 $20 to $21; Jackson Co. silvery, No. 1, $17 to $18; standard Georgia car wheel, $19 75 to $21.25; Lake Superior charcoal, $19 to $20.50.

PHILADELPHIA.

Oct. 23.

Throughout iron and steel circles the same tendencies are apparent as for some time past. Buying is still restricted, though most brands of iron can be bought at lower figures today than at any time in the last 15 months. Buyers do not feel, however, that next year's prices have been fully discounted. A greater demand in all lines is looked for after November 6, but the number of new plants and of improved old ones has greatly increased and it will take a large volume of business to fill them all. The coming winter, it is believed, will bring a better adjustment of prices of raw and finished materials. Talk is still heard of a possible adjustment of the price of steel rails, in view of the opinion entertained in many quarters that $26 is too high. Purchases are being made, but not on a liberal scale, apart from the Pennsylvania order, and in some cases under protest.

PIG IRON.—Reports are a trifle better than last week's. Insufficient supply of some good irons keeps the prices fairly steady but supply in lower grades is in excess of demand, and hence prices tend downward. Both buyers and sellers are feeling their way, although many inquiries are heard. There is a wide range of prices in the sales made, but the ruling quotations for Philadelphia and nearby delivery are about as follows: No. 1X foundry, $16 to $17; No. 2X foundry, $15 to $15.75; No. 2 plain, $14.25 to $14.75; gray forge, standard brands, $13.25 to $14.

FINISHED MATERIAL.—Business has been rather quiet during the week, but there is a bright outlook. The shipyards will be heavy buyers. One 4,000-ton contract will probably be closed in a few days, and other large orders are looked for in the near future. Bars are active, and mills are behind with their deliveries. Foreign demand continues good. There is no change from last week's prices. We quote: Best refined bar iron, 1.30c to 1.35c; steel bars, 1 25c to 1 30c; tank plates, 1.20c to 1.30c; beams and channels, 15-inch and under, 1.60c

to 1.70c; sheets, No. 12, 1.80c; No. 14, 1.90c; No. 18, 2.20c; No. 20, 2.30c; No. 24, 2 50c; No. 27, 2.70c; No. 28, 2.80c.

OLD MATERIAL.—Rather more movement is noted and sellers are asking somewhat higher prices for some grades, particularly heavy melting scrap. We quote as follows: Choice railroad scrap, $14 50 to $15; No. 1 yard scrap, ordinary, $13 to $13.50; No. 2 light scrap, $10.50 to $11; machinery cast, $13.50 to $14; heavy steel scrap, $12.50 to $12.75; old iron rails, $14.50 to $16; old steel rails $13.50 to $14; wrought turnings, $8 50 to $9; cast borings, $7 to $7 50; old car wheels, $16.50 to $17.50.

PRESIDENT PRITCHETT'S INAUGURAL.

The formal inauguration of Dr. Henry S. Pritchett, formerly chief of the United States Coast and Geodetic Survey, as president of the Massachusetts Institute of Technology took place on Wednesday, Oct. 24 in the new Symphony Hall in Boston. A distinguished company was present, consisting of representatives of colleges and universities from all parts of the country and of the alumni, the entire main body of the hall being filled by the students, 1 250 or more in number. Brief addresses were made by Senator Henry Cabot Lodge, by Col. Thomas L. Livermore on behalf of the corporation, and by former President Crafts. Dr. Pritchett's experience as director of perhaps the most important purely scientific branch of the Government service rendered his inaugural address upon "The Relation of Educated Men to the State" peculiarly suggestive.

Dr. Pritchett explained that for some years past, as an executive officer of the general government, he had been obliged to study the graduates of colleges and technical schools from the standpoint of their efficiency in comparison with other men rather than from the standpoint of the teacher; from the standpoint of their ability to do things rather than from the standpoint of knowing how to do things. In this capacity he had been forced to consider the relation of educated men to the government, to compare their service to it with the service rendered by others. He called attention to the fact that a constantly growing proportion of the important places of the government are passing into the hands of college men, and he asked the question whether the training received in our institutions of higher learning merely gave men increased power, or did the college life also fit men for patriotic and loyal and unselfish srvice to the state.

In considering this question he called attention to the fact that the state represents the whole people, that in this capacity it had given generously to higher education, both through the general government in land grants and through the state governments by direct taxation. Even our older universities like Harvard and Yale had at some time, almost without exception, received aid from the state. Harvard was really founded by the Commonwealth of Massachusetts. The state has, therefore, the right to ask what sort of instruction is being given in our higher institutions, and to know that in these institutions men are trained in high ideals of their civic duties.

While maintaining that on the whole the institutions for higher education had justified the aid which they had received from the state, President Pritchett brought forward certain qualities of education upon which he conceived the state had a right to insist and which had not always been remembered. He said, "The state has a right to expect of those educated in a large measure by its aid a decent respect for the service of the state." He deprecated the widespread tendency to belittle government service, and to ascribe lightly the worst motives to public men. "The Government of the United States," he said, "is honestly conducted, and notwithstanding the crudeness of some legislation and the half-hearted service of a few, those who know best the machinery of the general government have a rational optimism concerning the success of democratic institutions and a wholesome respect for those who work in public service. Educated men will find in increasing numbers their best career in the state's service, and college men should be the last to misunderstand and belittle it.

Another quality of the education given to the youth upon which the state has a right to insist is its catholicity. "No system of education," said he, "is a good one in which students and graduates get out of touch with the great body of their fellow citizens. The higher institutions of learning, if they are to fill their real place, must be not only for the people but of the people."

Beyond all such considerations, however, and including them all is the quality of citizenship which our education is likely to produce, and what education ought to mean. President Pritchett referred to the literature of the subject, quoting Aristotle's summary, "What is education, and how are we to teach, and are we to aim at the development of the intellect or the moral character?" He called attention to the fact that the whole aim of modern education was the attainment of power, and to this end the intellect alone was considered in the training given to young men. He said that the state was interested in having in its service keen, efficient, intellectual men, but that it was still more interested in finding men of courage and patriotism and unselfishness. In other words, in the service of the state, if not, indeed, in all service, character counted for more than intellect, and unless the training of the colleges and of the universities produced men who were not only intellectually able but who were also strong in civic virtue, they fell short of their full duty. "The men who graduate from our higher institutions should, along with the training of their minds, grow into some sort of appreciation of their duties to the state, and they should come to know that courage and patriotism and devotion rank higher in this world's service than scholarly finish and brilliant intellectual power."

President Pritchett then took up in the light of these remarks the character of the training which comes from the study of applied science, and called attention to the wise foresight of President Rogers and his associates in estimating the value of a scientific training, not only as a fitting for practical life but also in its development of character.

A New Crucible Steel Company.

A party of Philadelphians have purchased the Diamond Steel Co. works at Reading, Pa., and have incorporated as the Philadelphia Steel Co. Their purchase includes all the real estate as well as the machinery and equipment, together with the right to use several patents, the use of which it is claimed will greatly improve the quality of their tool steels, without increasing the cost. Aaron I. Sanson, Jr., who will be the general manager, is largely interested in the company. He has had 25 years' experience among the steel buyers of the country and has earned a reputation as a salesman. Walter Steel will be the superintendent at the mill. He learned steel melting with Willam Jessop & Sons, of Sheffield, Eng., and was 13 years leading man at the Baltic Steel Works. When he came to this country he gave six years' service to a New Jersey steel works, and was then selected to take charge of and erect the Carpenter Steel Works, of Reading. Mr. Steel also built the Diamond Steel Works.

The directors of the new corporation are Thomas W. Parker, D. F. Vaughan, Aaron I. Sanson, Jr., James O. David and Daniel F. Hallahan, who is the secretary. The main office of the company will be in Philadelphia in the Stephen Girard Building.

Obituary.

John A. Trefts, a member of the well-known firm of Farrar & Trefts, boiler and engine builders, died at his home in Buffalo, N. Y., on Friday, Oct. 12 He was 77 years old and had long been known as an expert foundryman.

Frank Williams, general manager of the Basic Fire Brick Co. at Johnstown, Pa., died on Oct. 16, at Johnstown of pulmonary trouble. He was 35 years of age, and was a graduate of Lehigh University.

Jeremiah J. Dwyer, superintendent and assistant manager of the Peninsular Stove Co., Detroit, and son of Jas. Dwyer, president and general manager of the same concern, died Oct. 16, after a six weeks' illness. Mr. Dwyer was 33 years old, and had been connected with the Peninsular Stove Co. for 15 years, working up from the lowest position.

WARNER SHOOK, superintendent of Alice Furnaces at Birmingham, Ala., has returned from a trip to England. Mr. Shook was tendered the position of blast furnace manager of the North Eastern Steel Co., of Middlesbrough, Eng., but decided not to accept.

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AND
INDUSTRIAL WORLD.

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THE TRUSTS IN POLITICS.

Commenting some months ago upon Senator Foraker's contention that the trusts are the product of competition and not of any tariff act, and that they have come to stay, it was remarked in these columns that this was more truth on the trust question than the country might expect to hear after the Presidential nominations were made and the stress of the campaign was upon the politicians. As a political issue the trust problem cannot come to a satisfactory solution. Both parties have declared against combinations that tend to monopoly. One Presidential candidate goes farther and declares his opposition to all trusts, good and bad, and a purpose if elected to proceed against them for their dissolution. There has been little appeal to reason in the campaign treatment of the trust issue. The *Manufacturers' Record* speaks truly when it says:

> The "trust" cry does not merit any attention, for every thinking man knows that fully nine-tenths of the talk about trusts is arrant nonsense without the shadow of foundation. It is simply political cant, and neither party has honesty and backbone enough to tell the truth and show that not even one-tenth of the statements made about "trusts" and their evils rests upon facts. These statements are mainly falsehoods, and very many of their authors either know them to be falsehoods or else are wilfully ignorant. Senator Jones deserves credit for having joined Southern inventors in developing a baling system which is just as much an advance on the old system as type-setting machines are an advance on old hand-setting methods.

The trust, so-called, is an evolution from the prodigious development of invention and industry in the United States that began soon after the close of the war. It has been accused of much that does not lie at its door. Unregulated it may become an instrument of great harm; but legislators need to know more than they know to-day before they will be competent to enact laws that will cure the disease without killing the patient. As long as the trusts are the worst sufferers from any violation of economic law of which they may be guilty, the public need not rush pell-mell upon a campaign of corporation extermination. If some of the threatenings that have been breathed out against corporations from the stump in the past few weeks were actually embodied in legislation, there would be financial and industrial distress from one end of the country to the other. There is in this demagogic appeal to discontent and envy a reappearance of the same spirit that in 1896 from campaign platforms in Chicago called the attention of workingmen to certain down-town buildings in some such words as these: "You built them; why don't they belong to you?"

Some return to sanity in the discussion of the trust problem may be expected when the political campaign is over. As in no other country, the financial, commercial and industrial interests of the United States are harried by the periodic disturbances incident to a counting of noses for the settlement of the profoundest economic questions. The currency problem, the most difficult and intricate of all, and one demanding the highest statesmanship, must be settled with us at the ballot box, where the vote of ignorance, ill-success and envy cancels that of the ablest political economist in the land. No more serious risk is taken by industrial capital in the United States than that growing out of unrestricted suffrage and the inevitable settling of even academic questions at the polls. As to the trust issue, now the most vexed of all the pressing problems in American life, we shall not despair of its right solution because politicians refuse to deal with it honestly. It is only 18 months since the craze for trust manufacture was at its height, and most of the checks and remedies thus far proposed have been based on prophecies of trust effects. Some of these evils need only time, and not a long time, for their cure. For others publicity will prove one of the most effective remedies. As to yet others time will show that they are far from being unmixed evil, and the world will learn that war upon them would be like the old-time attacks of harvest hands upon the self-binder.

PEACE OR WAR IN THE STEEL TRADE?

Now that the mills are through with boom contracts and current output is either of material ordered months ago, on which original prices were revised or of material booked at the low prices that began with July, the real test comes of the relative earning power of the large producers. While the spell was on, and buyers were clamoring for steel, considering themselves fortunate to get it even at the top prices, the fit and the unfit looked much alike in the general hey-day. All counted prodigious earnings; some more than others, to be sure, but all were so enormously prosperous that a difference of $2 or $3 a ton between the production costs of the mill of to-day and that of ten years back, did not signify. But $17 billets and 1c finished steel have brought a soberer situation and a sharpening of pencils for the working out of cost problems. As yet there is no serious indication of a battle of the giants, and the steel rail price indicates that the desirability of making dividends is still appreciated among the leaders. Yet that there are considerable variations in the costs of the big concerns is well

known, and this element may have to be reckoned with later on.

The question whether the consolidations will injure each other by the entrance of one upon the particular field that has been occupied heretofore by another, really resolves itself into a matter of steel-making capacity. In the case of some of the consuming interests — for example, tin plate mills, hoop and band and sheet mills — the business of supplying steel, which has heretofore been distributed among several producers, is now concentrated in the hands of one, and the steel companies which have lost this business will simply find an outlet for their steel in finished forms which they have not manufactured heretofore. The fact appears to be that there has not been such an expansion in the capacity for producing ingots as would cause any serious results from the competition that may ensue upon the entrance of steel companies upon new lines. It must be remembered that the country is growing rapidly and that an expansion of the tin plate, sheet and other industries which consume steel is to be expected. Apart from one plant in Western Pennsylvania and another in the Pittsburg district, it does not appear that serious additions are being made to steel producing capacity. Both these are open-hearth propositions and their combined output, as planned, will not amount to more than 2,000 tons a day.

All calculation as to the future relations of the large producers must provide for a very considerable increase in our export trade. It is not to be supposed that the consolidations will neglect this to engage in a destructive struggle for purely domestic business. The plans they all have on foot looking toward a foreign outlet are comprehensive and indicate that they will follow up this lead vigorously, not only in the expectation of sending abroad their surplus, but in building up the foreign trade into paying proportions. After such a boom as that of last year, and in the midst of the flattening out of many of the inflated promises that came with it, the tendency will be for a time to emphasize the great capacity the large producers have now provided for themselves. But it is to be considered also that there has been no small destruction of plant by the consolidations, and that much of the improvement work done last year consisted in substituting the new for the old.

The question really comes back to the outlet that will be afforded for American steel in foreign markets. Though at the moment there is a recession from the boom level in England, Germany, France and Belgium, it need not be taken for granted that a period of depression is to follow. If, as some fear, who are studying closely the European situation, a severe commercial crisis is ahead, due in part to the enormous exploitation of industrial undertakings, particularly in Germany, our manufacturers will have to stand their share of the troubles that will ensue. But barring causes that would produce a general depression, the descent from the boom level in foreign iron and steel prices may be accomplished as safely as in our own country. And then, with peace in South Africa, and the Orient opened again to trade, the conditions may concur for a further increase in the world's consumption of iron. If the steel makers of the United States are able to carry out their comprehensive plans for the development of a profitable trade in outer markets, there should be no such surplus of material as will crowd the home field uncomfortably in any line or lead to destructive contests for supremacy.

New Rolling Mill Company at Chicago.

[Special Telegram.]

CHICAGO, ILL., Oct. 24.—The plant of the Midland Rolling Mill Co., Cragin, Chicago, was sold this week to the Block Mfg. Co., a new corporation with $130,000 capital. The price was $65,000. The mill was built in 1898 for the manufacture of bars and shapes and is shut down at present, but will be started shortly. It comprises 10-inch and 9-inch trains, and covers two acres. The offices of the new company are in the Marquette Building, and the officers are: P. D. Block, president; G. H. Jones, vice-president; L. E. Block, secretary and treasurer.

Chicago Building Strike Settlement.

The strike in the building trades in Chicago, which has been in progress for the past year, is nearing the end. No definite settlement has been reached between the Building Trades Council, which is composed of the various trade unions, and the Building Contractors' Council, the association of employers, but several of the various individual labor unions have withdrawn from the Building Trades Council and have effected separate settlements with the employers. The latest of these settlements is that of the Bridge and Structural Ironworkers' Union, which withdrew from the Building Trades Council early this week, and effected a satisfactory arrangement with the Iron League, which is composed of the structural iron contractors. This agreement provides for no limitation in work, no restriction in machinery or tools, except prison-made, grants permission to use apprentices, makes the foreman the agent of the employer, and gives the workman the right to work for whomever he chooses and the employer the right to employ and discharge whomever he desires. The minimum is 50 cents an hour and no piece work is allowed. Non union men of other trades may work on the same building without objection from the bridge men, and the latter have the right to join a new central body other than the Building Trades Council, if they so desire and it does not conflict with this arrangement in any way.

THE Eleanor Iron Co., Tyrone, Pa., manufacturer of muck iron, merchant iron and skelp, has started its works in fulll and is operating its puddle mill day and night and the finishing mill on a day turn.

THE business and plant of the Durango Foundry & Machine Co., Durango, Col., is for sale. In 1893 it fell into the hands of the Colorado State Bank at Durango and has been brought to a paying basis, with the trade of the section tributary to it increasing rapidly. Large concerns that seek a market in competitive territory have a long haul to reach this district. The proposition now is to bring into the business practical foundry and machine shop men with capital. B. N. Freeman, president of the Durango State Bank, will answer correspondence.

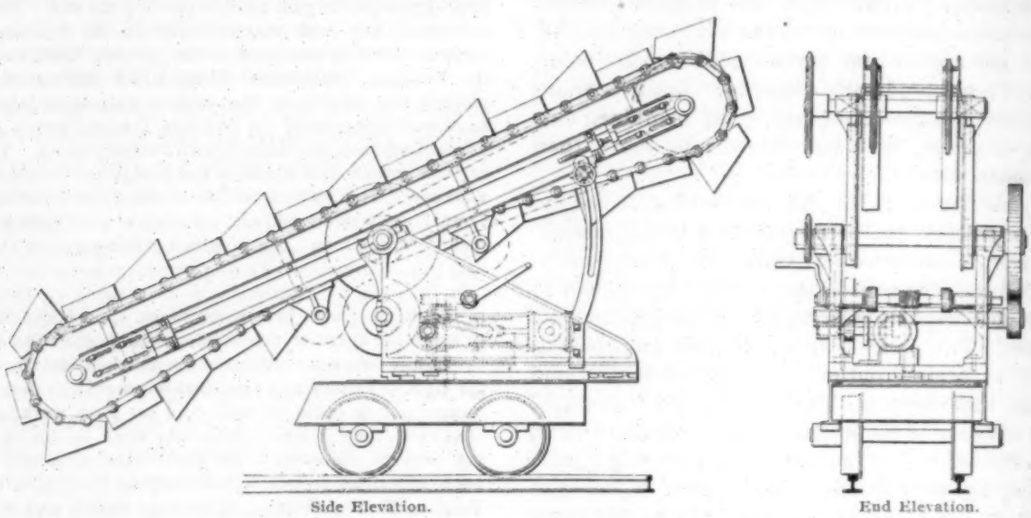
THE Lorain Foundry Co., Lorain, O., after a shut-down of more than three months because of the molders' strike in the Cleveland district, started its plant with non-union men last week. The new workmen will be lodged and boarded within the foundry enclosure, union pickets making it dangerous for a worker to reside outside.

THE American Bridge Co. was awarded the contracts for erecting steel buildings for the Sharon Steel Hoop Co. at Sharon, Pa.

EXCAVATING AND LOADING MACHINE FOR ORE.

The Jeffrey M'g. Co., of Columbus, O., has built an excavating and elevating machine which is in use at the Fayal mine, Eveleth, Minn., for loading into cars iron ore taken from the open pit, this being one of three methods of mining employed at this property. For the accompanying cuts and description we are indebted to the *Engineering News*. The machine has worked well as far as the principle of construction and operation is concerned, but some of the parts have proved unable to withstand the great strains and will have to be strengthened. It is the intention of the builders to remodel the design and strengthen the weak parts by heavier construction and to offer the machine for sale for all kinds of excavating and loading work for which it is suitable.

The accompanying drawings show that the principal part is the elevator, which consists of two strands of roller chain covered alternately with pans and buckets. The buckets are intended to pick up or excavate the load while the pans assist in carrying and delivering it to the cars. The elevator is mounted on a platform pivoted to a small car, so that it can be moved from place to place. By means of the pivot connection the elevator can be tilted up and down to adapt it to various depths of excavation and heights of elevation. The power to operate the elevator is supplied by a small horizontal engine mounted on the car body and operated by compressed air. The manufacturers also suggest the use of electrical power for operating the mechanism.



Side Elevation. End Elevation.

EXCAVATING AND ELEVATING MACHINE FOR LOADING IRON ORE INTO CARS AT FAYAL MINE, EVELETH, MINN.

Chicago Concern to Wreck Paris Exposition Buildings.

The Chicago House Wrecking Co., of Chicago, which wrecked the World's Fair buildings, the Omaha exposition buildings and the Chicago Post-office, has made a bid on the same work for the Paris Exposition. The officers of the company have been in Paris during most of the summer, and have about completed arrangements. The price for the fluildings has not yet been settled, but it is expected it will exceed the $30,000 paid for the World's Fair buildings. The task of wrecking the buildings is one of great magnitude, and few if any concerns are as well equipped to handle it as the Chicago House Wrecking Co. This company has a large plant at 35th and Iron Sts., Chicago, and handles a great variety and a large amount of second-hand and resold goods of all kinds. It has acquired a country-wide reputation in this business, and a successful termination of the Paris project will bid fair to make this reputation world-wide. In fact, the company has already a very large export business in its class of trade. It is hardly likely that the material to be obtained from the Paris buildings will be brought to this country, as there is a good market for all of it abroad. The company handles second hand machinery of all kinds, engines, boilers and steam users' supplies, tools etc., and constantly keeps a large stock of these at its Chicago warehouses.

LAKE SUPERIOR IRON MINES.

It is reported that negotiations are pending for the transfer of the Crystal Falls and Great Western mines, now owned by Corrigan, McKinney & Co., to the Oliver Iron Mining Co. Both are non-Bessemer mines. The Crystal Falls produced 147,364 tons last year and the Great Western, 43,316 tons.

Iron Ore, of Ishpeming, Mich., has the following concerning the number of men employed in the iron mines of Marquette county at various times in the past 10 years: "In 1891, Marquette county was working 8,000 men and 38 mines were in operation. That was about the high water mark in this county. In 1895, 4,650 men were employed and only 19 properties were busy. Up to September 1896, for the year ending that time, we were working only 4,153 men. For the year ending September 1899, we were working 8,655 men. For the year ending September 1900, we are working 6 627 men, and 31 mines and six explorations are operating." At one time when the depression following 1893 was at its worst only 3,096 men had employment in the mines of Marquette county.

Operations at Biwabik, Minn., are almost at a standstill. Shipments from the Biwabik mine have ceased, as all the ore contracted for has been supplied. The greater part of the force has been discharged. The shaft house and engine house of the Duluth mine, which were destroyed by the cyclone, will be rebuilt in about a month. Because of the recent flood the Hale mine is operating with but part of its force.

The Imperial and Webster mines, near Michigamme, Mich., operated by the Cleveland-Cliffs Iron Co., have been closed for the winter. These mines produce low grade ore, which would not pay to put into stockpiles after the close of navigation, as fifteen cents per ton would be taken off the margin. About 85 000 tons of ore have been shipped, and a force of 250 was employed throughout the season. If the market is favorable, work will be resumed in the spring.

At the Dober mine, Iron River, Mich., the piling ground is being leveled and planked, and the overhead tramway is being extended preparatory to stocking a large quantity of ore this winter. Other improvements include a pumping station on the river bank to pump water for the boilers, and a pump in the old river bed south of the new shaft. A number of men have been laid off recently, but a busy winter is counted on if the election result is favorable.

Among well-known iron trade men at present in the States, or shortly going there, are Mr. George Beard, of Glasgow, Mr. George Hatton and Mr. G. H. Claughton, of the Round Oak Works, and Mr. Edward Ascherson, of Naylor, Benson & Co., London. Mr. Beard, it is announced, will visit the principal iron and steel-making centers, and expects to leave orders in the States for steel bars and billets. His company have been purchasing supplies of these materials from the United States for some time past. It is Mr. Beard's intention to retire from active business next spring.—[London Iron and Coal Trades Review.

CHEMICAL CONTENT AND STRENGTH OF IRON.

To the Editor:

In the recent Franklin Institute discussion of the "Chemistry and Physics of Cast Iron" published in *The Iron Trade Review*, Prof. Henry M. Howe propounds some questions to Mr. Outerbridge, among which are the following:

What composition do you think gives the strongest cast iron? What the highest combination of strength and ductility?

Bearing on this subject I offer the following, taken from personal experience: A test bar 1 inch square and 13 inches long was poured from a ladle of cast iron into a mold which had an iron chill block on the bottom and green sand on the other three sides. The metal was melted in a cupola and was made up of a mixture containing no steel. Only 4 per cent of pig went into the charge, the other 96 per cent being scrap and remelted material with a little ferro-manganese. It was not so-called semi steel, but straight cast iron and was poured into plow points and other similar castings requiring a light chill. The test bar broke under transverse strain with supports 12 inches apart at 4,990 lbs. and was chilled half way through. Two other bars from the same ladle of iron poured in entire green sand molds broke at 4,075 lbs and 3,900 lbs. respectively. The total carbon in these bars was found to be 3.37 per cent. Can any one show equal breaking strength in cast iron bars? It is considered that 3,000 lbs. is good average strength for cast iron test bars 1 inch square.

Attention is called to the increase in strength of the bar chilled on one side, as compared with the other two bars cast in sand and not chilled. It is plain that the transverse strength of cast iron is not entirely governed by the chemical composition of the mixture, even when cross sections and areas are equivalent in the castings. Gray iron castings can be stiffened and thus strengthened under transverse and compression strains by chilling the surface, as the case above cited shows.

As to the second question, I have found the cast iron coming from the air furnace is as a rule more ductile or elastic than iron from the same mixture melted in a cupola, the silicon and manganese being identical in both cases; but I never have found a test bar made from air-furnace iron equal in strength under transverse strain alone to the test bars referred to above and poured from cupola metal. Air-furnace iron is as a rule lower in total carbon than cupola iron, and the combined carbon in this total carbon is lower in the air furnace metal.

With equivalent mixtures I find air-furnace metal to carry, in round numbers, 3 per cent carbon against 3.5 per cent in cupola metal. Chilled air furnace iron is softer than chilled cupola metal made from equivalent mixtures and with equivalent silicon and manganese, the total carbon being lower, however, due to the difference in the processes. This deficiency in carbon in the air-furnace chilled metal undoubtedly makes it softer than the cupola chilled iron; it also makes it tougher, as was demonstrated by comparing chilled iron mold boards made in the air furnace with similar castings made from cupola metal.

C. H. Vannier.

Chicago, Oct. 18, 1900.

After many months of negotiation it is now announced that there will be a reorganization of the Troy Steel Co., located at Troy, N. Y. About 90 per cent of the stock and securities of the company have been placed in the hands of J. P. Morgan & Co., of New York who will have a controlling financial interest.

The Harrisburg (Pa.) Pipe & Pipe Bending Co., manufacturer of wrought iron pipe, iron, brass and copper pipes, coils, bends etc., has recently made extensive additions to its plant, and reports a continuous and steady growth of orders. Many large orders for pipe are already booked ahead, and the outlook is promising. The new pipe mill of the company is in operation.

Wm. E. Hingston, Chas. H. Tuttle and N. M. Collins are the incorporators of the International Iron & Steel Co., which has been incorporated under the laws of New Jersey, with capital of $3,000,000.

At the annual meeting of the Badger Brass Co., of Kenosha, Wis., the capital stock was increased to $50,000.

PUBLICATIONS RECEIVED.

Forgings.—In an illustrated leaflet sent to the trade by Wyman & Gordon, of Worcester, Mass., makers of forgings, illustration is given of a group of iron and steel forgings made by this firm. They varied in weight from 7 to 65 pounds and comprised forgings for railroad car equipment, ordnance work, balls for bearings, pneumatic machinery, textile machinery and electric railroad construction, these being a few of the purposes for which the Wyman & Gordon plant makes forgings.

Hardware.—The Pleuger & Henger Mfg. Co., St. Louis, Mo., manufacturer of plumbing and water works specialties and hardware, has issued a catalogue of the goods it manufactures, printed in the Russian language, for distribution in Russia and Russian provinces.

Bells.—A pamphlet of 36 pages, issued by the C. S. Bell Co., Hillsboro, O., describes its bells in detail. The catalogue is illustrated throughout with half-tones, showing some famous bells and bell-towers.

Electric.—The "Instruction Book" of the Fort Wayne Electric Works, Fort Wayne, Ind., furnishes information in regard to the use of the type "K" integrating meters manufactured by the company. A number of analytical diagrams of connections for the meter are shown, and tables and formulas are given. The company is also sending out an 8-page pamphlet, Bulletin No. 1012.

Capstans.—The Browning Engineering Co., Cleveland, devotes its Bulletin No. 500 to the merits of its new steam dock capstans. This capstan has a new form of casing, and the steam cylinders, pipe connections, exhaust pipes and drip cocks are entirely outside the casing, thus securing greater protection to the mechanism, and economizing space. Views of the different working parts are shown. Electric power may be used in place of steam if required.

Lathes.—The American Lathe Co., Wilmington, Del., is sending out a pamphlet and blotters, calling attention to its semi-automatic turret lathe. The advantages from the standpoint of the proprietor, the superintendent and the operator are pointed out. The company has both American and foreign selling agencies.

Springs.—The American Steel & Wire Co. has issued its catalogue No. 4, in which many styles of springs are shown. Every process from the mining of the ore to the finished spring is carried on by the company.

Belting.—A catalogue of 101 pages, size 5x7½ inches, has been issued by J. E. Rhoads & Sons, Philadelphia, which illustrates the different styles of the Rhoads belt and appurtenances. The company manufactures oak tanned and tannate flat and round leather belting, tannate picker leather, belt preservers, valve leather, lug straps etc., and deals in rubber, gandy and cotton belting, belt fasteners and appliances, hose, packings and mechanical rubber goods.

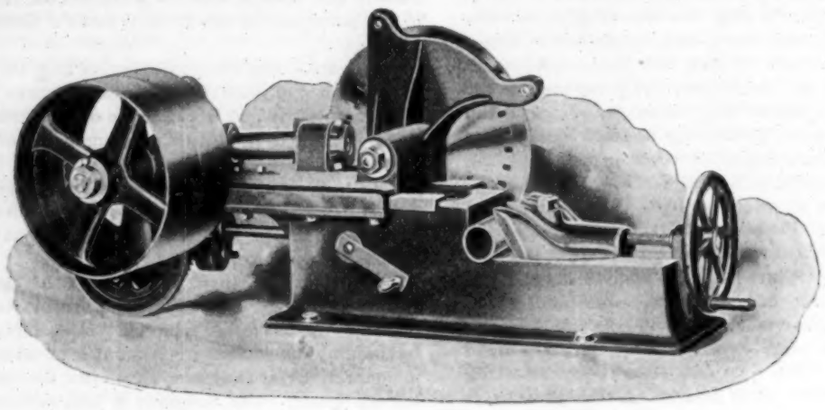
Flexible Metallic Tubing.—The claim "2,500,000 feet in actual use," is made for its metallic tubing by the United Flexible Metallic Tubing Co., Ltd., in a late catalogue. The advantages in the use of this company's flexible tubing is that being made from hardened copper and galvanized iron tapes, it will not char, kink or crush and is unaffected by climatic variations. Any size up to 8 inches in diameter can be supplied. It is used for conveying steam, water, gas, oil and greasy liquids, etc. Special brands can be made to withstand a pressure of 2,000 lbs. per square inch. Connections for tubing up to 8 inches are furnished. The company has designed special connections which are screwed to American standard, unless otherwise ordered. The Sharp, Klumph & Sisson Co., importers and general dealers, 1104, 1105 Monadnock Bldg., Chicago, deals in this tubing. Walter L. Flowers & Co., 1610 Chemical Bldg., St. Louis, are agents.

The Youngstown plant of the American Bridge Co is making extensive improvements. Ten cranes, ranging from 6 to 40 tons capacity will be installed, besides several new machines, among which are an air compressor and cold saw. The company will build the structural parts of the new machinery.

The United States Engineering Co., San Francisco, has purchased 10 acres of marsh land in Oakland, Cal., as a site for a ship building plant.

HIGLEY COLD METAL SAWS.

We reproduce herewith two of the Higley cold metal saws as put on the market by J. R. Vandyck, selling agent, 136 Liberty St., New York. The Higley method of driving saw blades has been employed by a number of mills and shops, but is not generally known. The principal feature consists of a shear steel sprocket wheel meshing in the radial slots cut in the blade and which draws the blade through the metal instead of forcing it from the center as in most of metal sawing machines commonly used. This method permits the use of nearly the full radius of the saw blade, as the supporting arbor is merely an idler and can be made of very small diameter.

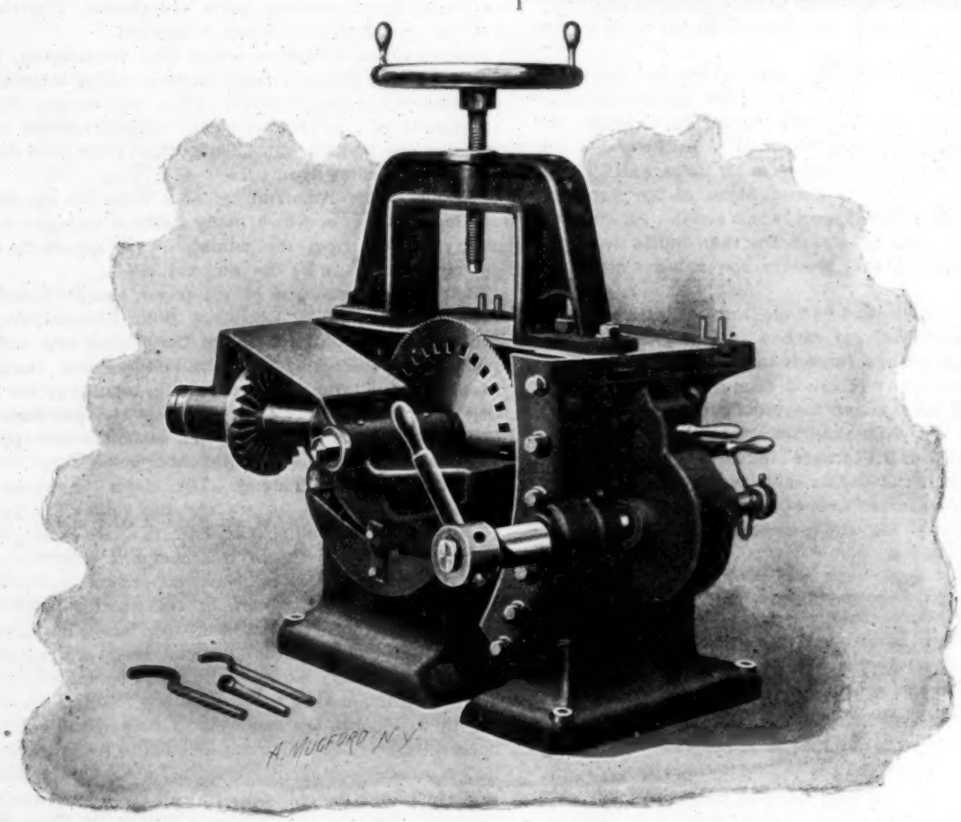


BENCH MACHINE.

Fig. 1 represents a machine of the "Cambria" type, designed and built for the Cambria Steel Co., of Johnstown, Pa. The requirement was compactness combined with large capacity. The floor space occupied by the Cambria machine is 42x44 inches and it has a cutting capacity for 15-inch I beams and 8-inch round sections. The machine is of strong and heavy construction, with hardened steel or bronze gears throughout, bronze lined bushings, and automatic feed.

Fig. 2 represents the smallest size in which the Higley machines are made. This is designed for small shops or for all light work in shops where time consumed in cutting off shafting or stock is of any consideration.

The machine has capacity to cut 4½-inch round sections and occupies bench space of 18x36 inches.



"CAMBRIA" COLD SAW MACHINE.

THE Glasgow Iron Co. has leased the plant of the Pottstown Iron Co., Pottstown, Pa., which has long been idle, and will soon place it in operation. A new puddling device, invented by James P. Roe, general superintendent of the Glasgow company, will be installed.

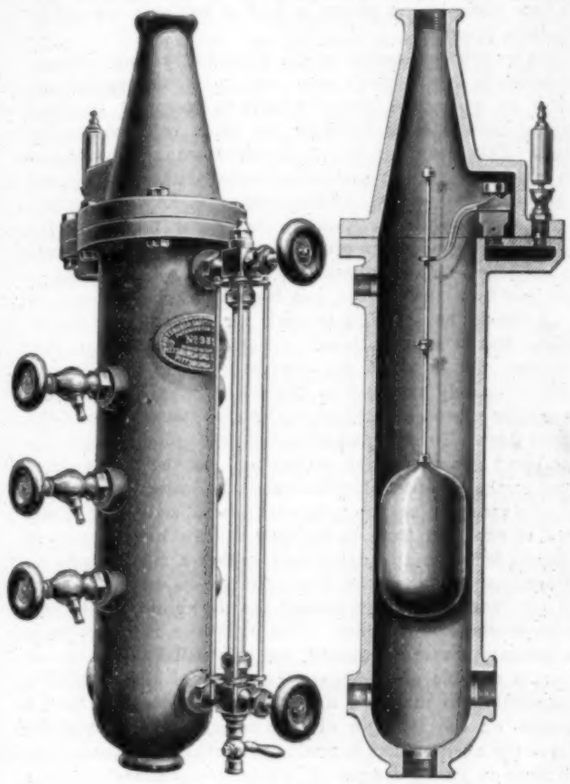
THE plant of the Shickle, Harrison & Howard Iron Works, located at St. Louis, Mo., has been shut down for an indefinite period. The company recently erected a plant at East St. Louis, where the cost of operation is considerably less than at St. Louis. It is probable that most of the men employed at the St. Louis plant will within the next few months find positions and permanent employment at the East St. Louis plant.

THE Imperial Wheel Co., of Jackson, Mich., will remove its plant to Flint, Mich., next summer. A tract of 25 acres has been secured for the location of the plant.

PITTSBURG SAFETY WATER COLUMN.

In designing its safety water column, views of which in section and in perspective are given below, the Pittsburg Gage & Supply Co., of Pittsburg, has studied simplicity in design, durability in construction and accuracy in operation. The device is so made that it indicates the stage of water in the boiler at all times and automatically announces the approach to high or low danger limit. The entire working mechanism comprises one float and one valve which indicate both high and low water. The float is of seamless copper, which will not leak or collapse, it being tested beyond its guaranteed capacity. It rests on the surface of the water, not being fastened rigidly to the valve, but is entirely free to rise and fall with the water in the boiler. When the water approaches either high or low danger limit, the knocker on the stem of the float releases the valve and sounds the whistle. The valve is frictionless, of solid brass and has no complicated parts. The float not being rigidly attached to the valve, neither is affected by the foaming of water in the boiler or by vibration.

These water columns are made of any capacity and for any



PITTSBURG SAFETY WATER COLUMN.

type of boiler. They are fitted with both right and left hand connections, and made of any size and for any type of boiler. Both high and low water alarms can be instantly tested at any time by the attendant.

THE Pittsburg Coal Co. has awarded contracts for the construction of a car works at Montour Junction, on the P. & L. E. railroad. The main building will be 300 feet long and 60 feet wide. An engine shed will adjoin it and be 45 x 125 feet. A brick car repair shop, 50 x 300 feet, will be erected also. In addition there will be a power house 35 x 60 feet, a two story office building 20 x 60 feet, and a record store building 23 x 33 feet.

WM. TOD & CO., Youngstown, O., have received an order from the Washburn Wire Co., East Providence, R. I., for a 1,000-h. p. engine. The company has orders booked for months in advance.

THE Sioux City Foundry & Mfg. Co., Sioux City, Ia., is working night and day to get out the large number of orders now on its books.

AMERICAN SPECIFICATIONS FOR STEEL RAILS.

At the London meeting of the American Society of Civil Engineers, at which the question of chemical and physical specifications for steel rails were under discussion, John F. Wallace, president of the society, spoke as follows:

"Two of the American engineers who have spoken on this question represent inspecting consulting engineers, and one the manufacturers. The speaker would like to say one word from the purchasers' side. The railroads themselves, up to date, have had very little to say about the specifications of the rails used in America, and mainly on account of business reasons. The railways to the east of the Allegheny mountains have naturally been confined to the use of rails manufactured in that district, first, on account of the fact that the manufacturers were also the customers of the railroads, and produced a great deal of freight and traffic; and secondly, because they were nearer the point of consumption. The same controlling elements exist in the mills in the vicinity of Chicago. The roads of the West, tributary to Chicago, were naturally inclined to purchase rails from the Chicago mills, and the result has been that the roads east of the Allegheny Mountains have been compelled to use rails manufactured in their district, which could be manufactured from the ores east of that point; and the roads in the Mississippi Valley and the West have generally been confined to the use of the rails manufactured in Chicago. A great many roads have endeavored to enforce their own specifications. On the other hand, the mills have endeavored to require the railroads to accept their specifications, coupled with a guarantee that any rails affected during the period of five years should be replaced.

"The railroads, today, through their engineers and their own special organization, which is looking after this particular matter, are now taking up the question of adopting specifications and asking the manufacturers to conform to them. The matter is now in the hands of a committee of engineers, who do not propose to draw up specifications which are impossible to fill; but intend to find out, from the character of the ores in different parts of the country, and from the processes of manufacture, what are the possibilities, and will endeavor to decide on specifications which are practical and commonsense. In the formation of such specifications, however, they expect to consult with the manufacturers and with the inspecting engineers.

"In reference to phosphorus, some years ago on the Illinois Central Railroad, on a section of road where the traffic was exceedingly heavy, there was in use a 60-lb. rail, laid in 1878. Twenty years after that rail was laid, it was removed in order to replace it with an 85-lb. rail. The rail gave such extraordinarily good service that it was analyzed and found to run as high as 0.12 and 0.15 phosphorus—from 50 to 100 per cent more than the specifications were then calling for."

AT Washington, D. C. the following bids have been received by the district commissioners for furnishing 60,000 lineal feet of 6-inch cast iron pipe: M. Q. Drummond & Co., New York, $23.70 per ton; Camden Iron Works, Camden, N. J., $23.88 per ton, and the United States Cast Iron Pipe & Foundry Co., Philadelphia, $23.40 (accepted).

THE American Steel Hoop Co. has reduced the wages of its non union men at the Union works in Youngstown, O., to conform with the wages paid the members of the Amalgamated Association under the new scale.

A CABLEGRAM from London announces that Earl Dudley, the Brymbo Steel Works in Wales and the owners of the Bertrand-Thiel process for the manufacture of open-hearth steel have formed a company for exploiting the process in Great Britain. J. H. Darby, of the Brymbo works, has been trustee for the owners of the patent in England.

A WASHINGTON dispatch says that negotiations for purchase of naval armor plate have progressed to a point which promise agreement, and attention is now being given to adjusting the details. It is intimated that the settlement will give the government armor at a price below that named in the bid price recently submitted by the armor companies, and that there will be a reclassification of thearmor.

THE MOLDER AND THE MOLDING MACHINE.

The paper of E. H. Mumford read recently before the foundrymen's associations at Pittsburg and Philadelphia, was a noteworthy contribution to the literature on that subject. It presented the results of experience with both union and non-union labor in the operations of machines, and commented on the action of the union molders at their last convention in seeking to get control of the machine, for the purpose of "developing its best possibilities." As a matter of interest to foundry proprietors, we give below an editorial review of Mr. Mumford's paper from the last issue of the *Iron Molders' Journal:*

"The paper on 'The Problem of Machine Molding,' should be carefully perused by our readers. It is true, its author, being interested in the manufacture of molding machines, might reasonably be supposed to be presenting the brightest side for the machine, but his criticisms of the attitude of the molder and his union to the problems which the machine has originated in the foundry, call for more than a mere passing consideration. His definition of a machine—'anything which substitutes a mechanical guide or movement, completely, for an action of a molder'—gives the problem a wider scope than that to which it has more recently been confined. It would be far-fetched, however, to dignify the common matchboard with the name of machine. It was one of those improvements in foundry practice made profitable by duplication of work, just as might be said of making flasks specially adapted for a certain casting; but, as Mr. Mumford very truly remarks, they were all steps of development toward the machine as we now know it.

"It is a well-known fact that handicraftsmen, in whatever industry they may be found, have been extremely conservative in the matter of accepting improvements in their trade methods. Their conservatism, we must freely admit, is not entirely devoid of that selfish element which prompts them to a policy of antagonism and obstruction. We can scarcely imagine what the result would have been had their narrow policy been pursued by society from all time. No progress could have been made, and the son would pursue 'the even tenor of his way,' as had his great-grandsire before him. It is an impossible condition to imagine, of course, and reduces to an absurdity the self-sufficient craft conservatism that, we regret to say, has not been entirely abandoned by the workmen of this progressive and well-developed age.

"Nothing can successfully stand in the way of progress. Be the obstructions men or methods, they will eventually be swept aside and the way cleared for a better and broader civilization. The past is teeming with examples of the truth of this, especially in the industrial field. If any improvement in the methods of production have merit it will live, in spite of any resistance offered by parties who will be made to suffer, temporarily, by its introduction. Although about ten years behindhand, it was this conviction which prompted the assembled delegates at the Indianapolis Convention of the Iron Molders' Union to formulate a more liberal policy on the question of the molding machine. It was felt then, as it is felt now, that the delay of the molders in thus placing themselves abreast of the times had prejudiced their case and made their policy more difficult of introduction. Foundrymen, finding that molders would not operate the machine as originally introduced, discovered that they could, with the expenditure of some money and patience, train unskilled help to become successful operators. It will be remembered, however, that the early machine was confined to the very simplest kind of work. But the rapid specialization of the foundry industry and the manifold increase in the duplication of work which that has made possible, opened a broader field for the operation of the machine, which inventive geniuses proceeded to take advantage of. And, today, we find the machine is no longer a simple hand-press of doubtful utility, but a well-developed piece of mechanism eminently adapted for the production of the simpler forms of castings, of which a large number is required. But as the machine develops and is adapted for use upon a more complicated or important class of work, the demand upon the skill and the intelligence of the operator is likewise increased. That is a point which, in all the contentions of the foundrymen against employing molders as operators, is usually ignored. Many of them claim, as Mr. Mumford apparently does, that they may be successfully worked by *unskilled* laborers. The adjective in this case is, in our opinion, improperly applied. As we have said, there is a class of work that has been adapted to the machine which requires a moiety of skill on the part of the operator. But such is not the case on all classes of work that have been so adapted. On much of this, skill equal to that of many a good molder is required, and the unskilled laborer who successfully operates the machine has ceased to deserve the term 'unskilled,' for he has really, by dint of training and experience, become a skilled man. His skill may be of a restricted order, it is true. He may be expert on one class of work only, but he eventually reaches a high state of efficiency, and cannot be supplanted by the unskilled man from the gangway.

"Much is made of the argument that the molder will not willingly work as hard as a laborer upon the machine because a strong back is the chief essential, and there is no opportunity for the application of his more extensive skill. There is undoubtedly some force in this reasoning as applied to mechanics of the higher grades, but it must not be forgotten that as a result of that same specialization which has made the machine a possibility, the chief essential on many a molder's floor today is as strong a back as was ever enjoyed by a machine operator.

Thus we contend, neither on the ground of skill nor of physical demands has a good case been made out against the molder as a machine operator, always excepting the very simplest class of work to which we made reference at the outset. This brings us face to face with what in our estimation is the most serious question to be satisfactorily answered on behalf of the molder, 'Will he bring out the best possibilities of the machine?' Assured that he will, much of the opposition that meets the proposition to allow him to operate the machine would disappear. The laborer accustomed to lower pay than the molder has been accustomed to, will, in all likelihood, be satisfied to work for less than the molder would. But it is a truth not unknown to business men that the cheap man is often the dearest one, and we believe it would ultimately be found so in the case in point, providing, the molder approaches the proposition in the same spirit the laborer does. To do this successfully old standards must be abandoned as a measure of production, and the new facilities tested on their merits. Unfortunately, in order to effect the sale of a machine, agents make exaggerated claims for it, and more is expected than is legitimate. We have known of instances in which the agent has bribed a man to make an extraordinary effort so that a record might be established that will convince the foundryman of the desirability of the particular machine offered him. This, it is true, is legitimate in the ordinary course of business, but it is well known that an expert is capable of a temporary outburst of speed, which it is impossible to maintain, and when a foundryman buys a machine on the strength of such an exhibition, it naturally follows the average man is unable to realize his expectations, and there is grave danger of future disagreement between the foundryman and his machine operator. In the instance cited in Mr. Mumford's paper, where the molder's output is placed at 65 flasks for $2 75, as against the laborer's 160 flasks for $2.40, we incline to the belief that other conditions not appearing in the bald statement have contributed to bring about the disparity. It will not promote the establishment of a healthy sentiment upon this important question to deny that molders have in the very recent past attempted to pursue a similar policy to that suggested by Mr. Mumford's example. The policy of arbitrary limitation of output is an untenable one and fatal to all hopes of a satisfactory solution of the machine problem. Foundrymen should not expect too much and molders should not do too little. There is a happy mean which should give mutual satisfaction and *would* do so if mutual prejudices could be dismissed. It remains, then, for some fair-minded foundryman to give the molders an opportunity to demonstrate the truth of these contentions. There is room here for a practical experiment that will do much to settle a question which is becoming a serious element of discord in the foundry, and we can assure the foundryman who makes it of the active coöperation of the officers and members of the Iron Molders' Union.

"Many of our friends took fright when the new policy of the union towards the molding machine was announced.

Their fears largely hung upon the interpretation to be given the word 'control,' which is sometimes injudiciously used by our correspondents when discussing the subject. In the paper which has called forth these remarks, the author evidently shares the worst fears of the foundrymen and thinks that 'control' of the machine by the molders means a restriction of its output and a general policy of obstruction. Nothing could be further from the spirit of the resolutions adopted at Indianapolis, nor more disastrous to the purpose of the Union, if it were true. We believe a vast majority of the molders of this country have been aroused to the folly of an antagonism which at one time went to the extreme of having resolutions passed commanding the editor of the Journal to refuse to accept an advertisement from a concern manufacturing molding machines. The progressive element is too strong in our midst to uphold a policy that can only find favor with the few who have been marking time for more than a generation, so that the fears which have largely been propagated by enemies of the union are groundless.

"In his report, as secretary, to the convention of the American Foundrymen's Association last June, John A. Penton paid us his compliments in the following terms: 'The molder and his union have placed themselves on record as not being opposed to the machine, but, on the contrary, are so much in favor of it that they are inclined to insist upon its control being put in their hands to the extent that none but union men should be employed to operate it. The irony of this is, of course, self-evident, and no one, not even the union advocates of that policy, are deceived as to what it means, viz., "restricted output."' It is expressions like these which have prejudiced the molders' case and it only remains for us to demonstrate by our liberal and fair-minded treatment of the machine question, that the insinuation is false and designed to raise an additional barrier between foundryman and molder. We are desirous, it is true, of having molders, preferably union molders, operate the machine. We are desirous of extending the jurisdiction of the union to include these men, not to restrict their output, but to protect them against the indiscriminate reduction of wages that is the lot of unorganized workmen everywhere. Our policy, as we stated in the September issue, is not to arbitrarily limit output whether we speak of the machine or the hand molder, but, where the necessity arises, to protect men in their wages and against the evil of overwork. That limitation of production which aims to keep the output within the limits of physical endurance is surely such as will be commended by all right-thinking foundrymen, and with such we can clasp hands and work together both in bringing out the best possibilities of the machine and in promoting the highest development in the foundry."

HOT METAL FROM RANKIN TO HOMESTEAD.

Unless the unforeseen happens, the Carnegie Steel Co. by another month will be using molten iron from the Carrie furnaces at the Homestead Steel Works, situated diagonally across the Monongahela River from the blast furnaces. The main span of the new bridge will be swung into place within a week or ten days and the remainder of the work will be comparatively easy from an engineering standpoint. The bridge is being built at Rankin station, a few miles up the Monongahela River from Pittsburg. The purpose of its erection is primarily to utilize the molten iron from the Carrie furnaces at the Homestead mills and secondarily to give the Union Railroad, one of the Carnegie interests, a right of way to the Carrie furnaces. Ore and other material used at these furnaces now comes by way of the Baltimore & Ohio and Pennsylvania railroads. From an engineering standpoint the bridge is noteworthy. An idea of the dead weight which it will be able to sustain can be gained from the fact that not even a girder will be strained if a continuous train of hot metal ladle cars were stretched across the bridge and at the same time another continuous train of ore cars were stationed upon the other track.

At the present time, the hot metal that is used at the Homestead Steel Works is brought from the furnaces at Duquesne, a distance of nearly 4½ miles. The new route from the Carrie furnaces to Homestead is less than a mile in length. Furthermore, since the steel producing capacity of Duquesne is being largely increased it will soon require all the metal produced at the adjoining furnaces. In addition, the molten iron in transit from the Duquesne furnaces loses much of its initial heat. And this is not at all surprising since from the time the iron is tapped from the furnaces until it reaches the mixers nearly an hour elapses. It is estimated that the time from the furnaces at Rankin to Homestead will be at the most 20 minutes. While no trouble has been experienced from the loss of initial heat under the present arrangement, it can be readily seen that the shorter route will mean a saving in fuel at the steel works.

The main span of the bridge is 500 feet in length and will weigh, approximately, 2,500 tons. For its length this span is one of the heaviest in the world, for a two track bridge. The shorter span, which is already in place, is 252 feet in length and its weight is in proportion to that of the longer span. When completed the bridge will weigh approximately 9,000 tons. The total length is 2,300 feet and in addition to the two tracks there is a sidewalk. The one track will be for hot metal trains exclusively, and the other for taking ore, limestone, etc., to the Carrie furnaces and for the transportation of slag from the furnaces. The hot metal tracks will be entirely enclosed in steel below and on the sides. The purpose of this is to protect passing vessels from the hot metal in case it should splash. In addition it is a protection to the steel entering into the construction of the bridge. With hot slag from the furnaces the same precautions do not have to be taken as it does not retain its initial heat like the molten iron, and should it fall from the ladles it will not be hot enough to damage passing steamers or to injure any of the steel parts of the bridge.

The ties carrying the hot metal track will be of wood and not of metal as has been published. However, they will be well protected from the molten metal. The tracks will be guard-railed and on either side will be inclosed by steel plates, ⅜ inch in thickness and reaching to a height of 4 feet. For a distance of 6 feet above this there will be plates ⅜ inch in thickness. The heavier plates will be clamped to the tracks and in addition will have a fire brick covering. Sand will be filled in between the ties and will be spread over them.

The bridge contains some of the heaviest pieces of structural material ever put in a similar structure. There are eight girders and they range in weight from 59 to 70 tons. The batter posts of the main girder are 48 inches in width. The channel span will be a trifle over 81 feet between centers of bottom and top chords, the bottom chords being composed entirely of steel bars 10 inches wide and ranging in thickness from 1⅛ inches to 2 5-16 inches. The top chord will be 48 inches wide and 36 inches high, having four web plates extending the entire length of the span. These chords are in sections of 53 feet, weighing from 36 to 38 tons each. The end posts will be 78 feet long and will weigh about 52 tons each. Adjoining the big span are two deck spans, 122 feet 3 inches long, made of plate girders, weighing from 51 to 70 tons each. At the Homestead terminus there is a Y, the tracks leading to Duquesne and Homestead steel works respectively.

The bridge is being built by the Keystone Bridge Works of the American Bridge Co., and rapid work has been done in its erection. It is only a few months since the piers were completed and the trestle work commenced. The erection of this bridge adds another hot metal route to the other two now extending across the Monongahela River. The Port Perry Bridge has been doing service for the Carnegie Steel Co. for several years and is now in use, and Jones & Laughlins, Ltd. are completing a hot metal bridge across the Monongahela River from the Eliza blast furnaces on Second Ave. in Pittsburg to the company's South Side steel works. The Rankin hot metal bridge was designed by W. H. Smith, chief engineer for the Union railroad.

THE annual convention of the Association of Bridge and Structural Iron Workers was held in Pittsburg this week. The convention suggested the formulation of a scale of wages to be paid to structural iron workers all over the country, and to do away with the many different scales paid at the present time. It is hardly probable that this plan will carry, the association having not yet gained sufficient strength throughout the country.

CAST IRON CAR WHEELS.*

BY G. W. BEEBE.

The Interstate Commerce Commission, in its report of June 30, 1899, gives the number of cars and locomotives in use in the United States, as follows: Locomotives, 36,234; coaches, 33,595, and freight cars, 1,248,826. Taking eight wheels to each freight car, and allowing 50 per cent of the wheels under coaches and locomotives for steel tired and designs other than the cast iron wheel, there are in use at the present time 10,269,924 cast iron wheels. Taking into consideration the small amount of damage done, due to the failure of the cast iron wheel, it would almost seem that the manufacture of the cast iron wheel has been brought down to a science. Undoubtedly a persistency in the use of the drop and thermal test has been productive in bringing about these favorable results. A prominent wheel manufacturer made the remark recently that close inspection and tests had been leading factors in lifting him out of a rut in which he would doubtless have remained had it not been for inspection and tests.

A number of manufacturers of cast iron wheels have made quite a protest against the thermal test, assuming that, in making wheels to meet this test they would do so at a sacrifice of the wearing qualities. While the adoption of the thermal test does not date back far enough to give correct data on the subject, we think there is no reason for this anxiety on the part of the manufacturer regarding loss in wear in wheels made to stand thermal test specifications, provided the thermal test specified is a reasonable one. For the fact is

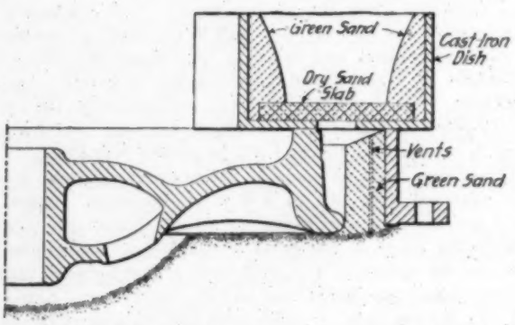


FIG. 1.—METHOD OF POURING FOR HEAT TEST, C. B. & Q. R. R.

conceded that, no matter what may be done with a car wheel, some extraordinary conditions may arise which will break it.

The thermal test specifications as required by the Chicago, Burlington & Quincy are as follows:

"The test wheel must be laid flange down in the sand and a channelway 1⅛ inches wide and 4 inches deep must be molded with green sand around the wheel. The clean tread of the wheel must form one side of the channelway and the clear flange must form the bottom. (It will be noted that the width of the channelway is equal to the height of the flange, namely 1⅛ inches). The channelway must be filled to the top with molten cast iron, which must be poured with two ladles directly into the channelway. The molten iron must be taken from the big ladle directly after a tap for pouring wheels has been drawn from the cupola. The channelway must be filled with the molten iron in no greater time than one minute after the iron has been taken from the big ladle. No puddling or cooling of the iron will be allowed. If the molten iron boils in the ladles, they must be refilled until all indications of boiling cease before the channelway is filled. The time when the pouring ceases must be noted, and two minutes later an examination must be made, and if the wheel is found cracked in the plates or through the thread, the wheels represented by the test wheel will be rejected. Wheels that are wet or have been exposed to the frost may be warmed sufficiently to dry or remove frost before testing. Fig. 1 shows the method of pouring the thermal test.

"In addition to the above, the following recommendation is made, namely: 'That at the option of the manufacturer, if the test wheel fails under this thermal test, a second wheel showing the next lower shrinkage size, to the wheel which failed and cast on the same date as the failed wheel, may be selected by the inspector and used for test. If the second wheel stands the thermal test, all wheels of the same and all lower shrinkage sizes may be accepted, while the wheels of the same and higher shrinkage as the failed wheel must be rejected.'"

Wheels tested according to the above thermal test specifications, and in conjunction with the Barr drop test, will assure the railroads the greatest degree of safety in using cast iron wheels. The above recommendations are made for the following reasons, namely: The shrinkage allowed on a cast iron wheel is ⅛ inch, ¼ inch above and ¼ inch below the mean circumference, divided in four tape sizes of ⅛ inch. The tape No. 1, or highest shrinkage, are the weaker wheels, conditions being normal. The inspector being aware of this almost invariably selects the tape No. 1, or highest shrinkage number, for test. He is justified in so doing, for the first thing to consider in the inspection of wheels is the point of safety. If the tape No. 1 fails when in the thermal test, reject them, and allow the inspector to select one of the tape No. 2, or next lower shrinkage number, and if the second wheel fails, reject all of the wheels represented; providing, however, the second wheel stands the thermal test, it seems hardly fair to the manufacturer to condemn the second and lower shrinkage numbers, the inspector being satisfied by test on the second tape sizes that they are sufficiently strong and are hard enough to give the wear.

An inspector should make a study of iron, so that he can readily designate at a glance whether the first wheel failing could be attributed to bad iron or abnormal conditions in the pitting or handling of the failed wheel. A wheel can be

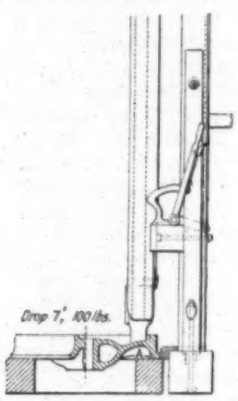


FIG. 2.—BARR DROP TESTING MACHINE.

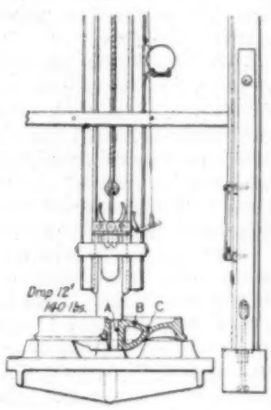


FIG. 3.—M. C. B. DROP TESTING MACHINE.

made of a hard, close grain iron that will stand the drop test or concussion in service, but if subjected to a severe and continued brake application is liable, as a boy says, "to go up in smoke." A gritty, hard chill will not make the mileage that a tough chilled wheel will. A gritty chill will shell out quicker than a tough one, because it will not stand the heat that is caused by severe brake application. Good white iron is tough, as well as being hard enough. There is a great difference in the quality of white iron as there is in gray iron; good white iron has a large proportion of combined carbon; bad white iron has a large proportion of sulphur. I believe the steel-tired wheel proves that the toughness gives the wear. I have not seen or heard of a steel-tired wheel shelling out. I have heard some railroad men say that when they can cut the chill of a wheel with a chisel, that the wheel will not make good mileage. If this is the case, the steel wheel could not make the mileage that is claimed for it, because the steel-tired wheel is turned before being put into service, and it certainly must be soft in order that it can be turned. These hard, gritty wheels will fail in the thermal test, or by severe brake application.

The following table shows a comparative record of tests made by the writer under the Barr drop, in 1893, as against tests made in 1900:

Test of Wheels Made in 1893—Barr Drop.

Wheel No. 000, tape 2—weight, 595 pounds; diameter 33 ins.—Number of blows to break	14
Wheel No. 000, tape 2—weight, 585 pounds; diameter 33 ins.—Number of blows to break	21
Wheel No. 000, tape 2—weight, 585 pounds; diameter 33 ins.—Number of blows to break	37
Gen. ave. of blows to break	24

*From a paper presented before the Western Railway Club. Mr. Beebe is wheel inspector of the C. B. & Q. R. R.

Test of Wheels Made in 1900—Barr Drop.

Wheel No. 000, tape 2—weight, 585 pounds; diameter 33 ins.—Number of blows to break..... 175
Wheel No. 000, tape 2—weight, 585 pounds; diameter 33 ins.—Number of blows to break 227
Wheel No 000, tape 2—weight, 585 pounds; diameter 33 ins.—Number of blows to break 93
Gen. ave. of blows to break 165

The above wheels tested were made by the same manufacturer, and these tests certainly show a marked improvement in the strength of wheels made in 1900, as compared with those made seven years ago. Regarding the depth of chill, it should not exceed ¾ inch in the throat, or 15-16 inch in the center of the thread. The minimum should not be less than ¼ inch in the throat, or ⅜ inch in the center of the tread. Assuming that we have the maximum depth of chill, 15-16 inch, we get the blending of the white iron through the entire tread and begin to crowd the danger line, and gain nothing thereby. A highly chilled wheel will shell out and become comby by sliding more readily than a medium chilled wheel. In breaking up 300 defective wheels that were removed on account of shelled spots, 95 per cent showed a high chill.

The design of a pattern is one of the essential factors in the manufacture of the cast wheel, other than the thickness of flange, shape of hub and tread. The designing of the pattern should be left to the discretion of the manufacturer. A large percentage of wheels that fail in the brackets can be ascribed to a poorly designed pattern; too light brackets will crack because they cool more rapidly than the plate of the wheel, which would cause a strain on them; too heavy a bracket will throw the strain on the plates, causing the plates to crack.

For those who are not familiar with the drop test used in testing wheels, Fig. 2 gives an illustration of the Barr drop, and Fig. 3 the M. C. B. drop. It will be noted that the hammer of the Barr drop strikes the single plate of the wheel, see letter "A" on Fig. 2. The hammer of the M. C. B. drop strikes the hub of the wheel, see letter "A" on Fig. 3. A wheel rarely fails in service in the hub, double plates, or at the intersection of the plates, see letters "A," "B" and "C" on Fig. 3. If a crack does occur at these points it does not necessarily cause the wheel to become dangerous. If a crack occurs in the single plate, see letter 'A "on Fig. 2, we then have a dangerous wheel and it will not run long before giving way entirely. It will be noted that wheels tested under the M. C. B. drop are placed flange downward on an anvil block, having three supports for the flange of the wheel to rest upon. The hammer strikes the central part or hub and the whole of the wheel resists the concussion; while the wheels tested under the Barr drop are placed flange downward on a flat surface anvil block, and the wheel receives the concussion at one point only. The Chicago, Burlington & Quincy specifications require wheels tested under the Barr drop to stand 50 blows without breaking out a piece. The Pennsylvania Railroad specifications, I believe, require wheels tested to stand 12 blows under the M. C. B. drop without breaking out a piece. It would seem fair to assume that the Barr drop would find the weak or dangerous part of the wheel more readily than the M. C. B. drop.

The treatment and handling of the hot wheel has nearly as much to do with the strength as does the material used. Cold iron will produce seams in the tread, and internal strains, because the molten iron sets in the mold as fast as it is poured. Hot iron with slow and uneven pouring, produces sweat in the throat, uneven chill and internal strains; delay in getting the hot wheel into the pit after being shaken out of the mold, will also produce strains in the wheel by uneven contraction. To overcome these undesirable results it is necessary to have hot iron and fast pouring. The maximum limit of time in pouring up a 33-inch wheel should not exceed 12 seconds. Wheels must be got into the annealing pits expeditiously after being shaken out of the mold. The annealing pits should also be covered properly. The following table gives the analysis of a number of wheels tested under the Barr drop and in the thermal test.

	Wheels that failed in thermal test.		Wheels that stood thermal test.		Wheels that failed under 50 blows, Barr drop.		Wheels that stood 50 blows and over, Barr drop.	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Total carbon	3.91	3.63	3.90	3.38	3.87	3.42	3.93	3.49
Graphitic carbon	3.02	2.92	2.98	2.71	3.19	2.90	3.02	2.90
Combined carbon	.89	.71	.92	.67	.68	.52	.91	.59
Sulphur	.093	.042	.10	.080	.080	.020	.070	.05
Manganese	.60	.49	.48	.48	.62	.40	.71	.47
Silicon	.82	.50	.91	.50	.97	.67	1.10	.68
Phosphorus	.48	.39	.52	.36	.58	.39	.53	.28

A part of the wheels failing under these tests cannot be ascribed to the composition.

FOREIGN RAIL AND STRUCTURAL CONTRACTS.

Representatives of the Colonial Office of the Dutch Government who were sent direct from The Hague, closed a contract with the Carnegie Steel Co. last week for 12,000 tons of steel rails for extensions of road in Java. They will also purchase engines from the Baldwin Locomotive Works and cars from the Pullman company, and machinery for a water works plant in the eastern part of Java. Other rail contracts from the same source may come to American works.

John Price, representing the Great Southern & Western Railway of Ireland, has just placed an order with the Maryland Steel Co., located at Sparrow's Point, for 3,000 tons of steel rails. Two years ago Mr. Price placed a similar amount of rails here for his company. He said while at Baltimore: "We are buying our rails here for the very obvious reason that we get them about 10 per cent cheaper than in England. The fact that this is our second order is conclusive evidence that American rails are satisfactory."

The Maryland Steel Co. has also received from the London, Brighton & South Coast Railway an order for 3,000 tons of rails.

Important contracts for South African work are said to be under negotiation in the United States. It is reported that Major Girouard, director of South African railways under Lord Roberts, intends to give orders for locomotives, rolling stock, bridges and machinery to reconstruct the railways and machine shops destroyed in the Boer war, and that the American Bridge Co. has been asked to furnish bids for over 6,500 tons of bridge work. The reports of these contracts and negotiations have caused some commotion in England and protests have gone into government offices on behalf of British firms. Joseph Westwood & Co., Ltd., engineers and contractors, writing to a London paper thanking it for its efforts in behalf of English contractors, asserts that within the previous fortnight steel viaduct constructional work worth £100,000 had been placed in the United States by the British Government for the Uganda District.

A London cablegram of Oct. 19 says: "The officials of the British War Office deny assenting to any contracts being given to American firms for railroad material to be used in South Africa. They say that if any contracts have gone to the United States the Colonial Office or the South African Colonial Government is responsible. The Colonial Office officials deny sanctioning the giving of any such contracts to Americans, and the representatives of Cape Colony in London say they do not know of an order being placed in the United States. But Sir Walter Peace, the Natal Agent-General, while saying that Natal's orders had been wholly placed in Great Britain so far, had evidently seen an American proposal, for he warned the members of a British firm that if they seek to compete successfully against Americans they will have to realize more fully that time is the essence of contracts, and they will also have to lower their prices."

The Cape Town correspondent of the London *Daily Mail* says: "Despite all denials I learn that large orders for coal trucks to be used in the Transvaal colony have been placed in the United States at prices for delivery here, which are 20 per cent below English prices, while the Americans have contracted to deliver in half the time required by the English. The Transvaal military railways have placed an order for tank engines to the value of £250,000 with English firms, although the prices are 20 per cent over American quotations. The great drawback to English work is delay in delivery."

THE report recently current, through publication in the British trade press, that in connection with the Paris Exposition the American Tin Plate Co. has taken an order for 1,000 boxes of tin plate a month to go to France, has been officially denied. The relatively high labor cost in this country makes it impossible to export plates.

The new plant of the Toledo Bridge Co. at Toledo, O., will commence operations about the first of the year. The buildings are already under roof and the installation of $100,000 worth of machinery has been commenced.

The Canton Steel Roofing Co., Canton, O. recently made a shipment of roofing to Italy.

NOTES ON TRAVELING CRANES.*

BY GEORGE E. FLANAGAN.

The day of the supremacy of mere brute strength in our mills and factories ended with the substitution of the locomotive for the pack-horse on our roads, and all our methods now tend to the reduction to a minimum of the need for the exertion of physical strength; and instead we harness the energies that emanated from the sun during centuries long gone by. There are various methods by which these energies, buried for so many thousand years in the coal beds, may be made to serve as our lifters and carriers; and accordingly we have had many types of cranes, both rotary and traveling, operated severally by steam, water, compressed air, belt, shaft and rope transmissions; all useful and practicable methods, and modern ingenuity might be depended upon to produce far greater results with any of them than has yet been done if there were no better means at hand.

The development of the electric motor, however, has rendered all the other forms of cranes more or less obsolete for general shop service, although there are many special requirements for which the older forms are most admirably adapted. One has but to compare the appearance of the old-time shop, with its numerous swinging cranes and various makeshift methods of handling heavy weights, themselves presenting no small obstruction to the progress of work on the floor, with that of its more recent prototype under the influence of one or more modern, high-speed electric travelers. In the latter case, the floor is left clear for the operations of various legitimate functions thereon, while masses of material are carried bodily over other work in process of erection. In fact, overhead cranes capable of carrying a 100-ton locomotive are not uncommon, while the directness with which they accomplish their work is apparent when we consider that in the hands of a skillful operator the combined motions of the bridge and trolley, which are usually carried on simultaneously, result in approximately a straight line in the desired direction. For the sake of saving time the hoist motion is, not infrequently, caused to act along with the other movements of the crane. All of these operations are rendered more directly feasible by the ready adaptation of power derived from electric motors, and, so far as one may at present predict the future, the electric crane bids fair to hold ground far in advance of its rivals for general service.

Power cranes driven by rotating square shafts may perhaps be regarded as the immediate forerunner of the electric traveler, but with their manifold objections, not the least of which were the trembling bearings for supporting the driving shaft, they were promptly abandoned when something better presented itself. In the earliest applications of electric power, the effort was made to have one motor furnish power for several different motions, involving clutches, frictions, and other objectionable features. Even with independent motors, the old time crane with its high speed bi-polar machines and multitudinous small gears presented an appearance vastly different from the crane of today, with its few parts, and simple, strong construction.

Recent requirements in some large shops have called for the installation of a large number of cranes upon the same runway, often of greatly varying capacities, and the employment of what have been sometimes called "double deckers" is steadily growing in favor. The term "double decker" is certainly a misnomer in this connection, as it simply refers to two independent cranes, one placed high enough to pass over the other, and, if anything be "double decked," it is the building. Usually the upper crane is much the lighter of the two, though sometimes the reverse is the case, in order to attain the requisite height for handling large pieces, and also for the heavier and larger shears and longer hook required, but this involves carrying the heavier supporting columns to the greater height and correspondingly increasing their sectional area and consequently their cost. The lower crane is a shorter span, to allow it to clear the supporting columns of the upper one. Sometimes, if comparatively light, the runway for it is carried on brackets from these columns. Where two cranes are not desirable, the same end may be in some measure attained by designing the heavy slow speed trolley with the addition of a light, quick-acting auxiliary hoist, for the rapid handling of small loads, or by using two trolleys on the same bridge.

Similar to the ordinary traveler is the gantry crane, with runway on the ground level. In this form, the end truck comprises a structure, usually in the form of a capital A, or, for the sake of making simpler connections, sometimes bearing a greater resemblance to capital H, and of a height sufficient to give the required elevation to the trolley. Either form of structure requires to be well braced laterally, to provide for strains due to suddenly starting and stopping the crane, which, as the center of gravity of the moving mass of machinery and load is so far above the rails upon which it runs, must always be more or less of an unknown quantity; but, in the nature of things, will at times be very severe.

Traveling cranes are essentially a class of machinery which should be substantially constructed, with all parts amply proportioned for the loads they may be called upon to sustain. Gearing should be of steel, and for smoothness of action and quiet running, cut teeth are much to be preferred. Malleable iron gives fair results, but will not stand the same amount of abuse as steel castings; while cast iron has its low cost chiefly to recommend it. The master gears, that is the wheel directly connected to the drum together with its pinion, usually have the teeth shrouded to the pitch line, so of course, cannot have cut teeth. The wheel is best connected directly to the drum, to avoid driving through a shaft, and should be of comparatively large diameter to reduce the load upon the teeth. These gears should be arranged as shown in Fig. 1, in order to put the least load on the drum shaft bearings. It will be noticed that, for the proportions given, the pressure is three times as great arranged as in Fig. 2, for the same load on the hoisting chains. This principle should be observed throughout the entire train of gears, but it is one that is frequently lost sight of.

Gears should not only be strong enough to endure the load, but should be of ample pitch and broad face to insure wear. Pinions ought to have not less than 15 teeth, and the line had best be strictly drawn at 12 as a minimum. The so-called thumb-shaped teeth are occasionally used on master gears where greater strength is required with a given pitch. Since simplicity is an admirable quality, the best designed avoid the use of such features as bevel gears, miter gears, internal gears, worm and spiral gears. Idle gears are also an objection, as they waste power in friction, and are productive of nothing unless it be noise. The drum is almost invariably of cast iron. The smaller ones are cast solid upon the shaft, while the larger sizes are hollow and keyed in place, but are heavy enough to offer great resistance as a center loaded beam. The outside is turned to a true cylinder, with accurately shaped spiral grooves, rightly spaced to suit size of chain links. In the matter of chains, the best is none too good. Short link, well-made special chain of tough, homogeneous material is needed, and it should not be required to go around a drum or sheave less than 20 to 25 times the diameter of the iron from which the chain is made. The chain should be securely anchored to the drum, and be long enough to leave from one-half to one full coil on the drum, with the hook in its lowest position. On some smaller cranes and hoists, wire rope is used in place of chain, requiring less room.

Chain sheaves are usually turned with grooves the same as the drum, and with deep flanges to prevent the chain from working off. Sometimes the groove is omitted and a ridge left in its place; the links then lie across this ridge at an angle of about 50 degrees with the plane of the sheave. This form of wheel meets with less favor than the other style, but takes less room. The lightest cranes have the hook suspended from a single chain, and present the objection that the load sways freely from side to side, if either the trolley or bridge is started suddenly. Where the chain is led from the drum down under a sheave and back to an anchor on the trolley, there is greater steadiness, in one plane at least; and where the chain is fastened at each end of the drum, winding toward the center around a right and left hand groove, carried beneath double sheaves at the hook, and the center of it hung over a balancing sheave connected to the trolley, we have four point suspension, and a minimum amount of swaying of the load. Still heavier work requires eight chains with additional sheaves, but involves no change in general form. Two

*A paper read at Pittsburg, before the Engineers' Society of Western Pennsylvania, October meeting.

drums are used at times, with a view to producing a perfectly vertical lift, but result in a multiplicity of parts and increased cost. Between the respective merits of light chains and many of them, and heavier chains and fewer of them, opinions differ, but the desire to simplify limits the number to four, or at most eight, and the fewer times a chain is bent around a sheave the better for it.

Hooks are made from forged iron or steel, or from cast

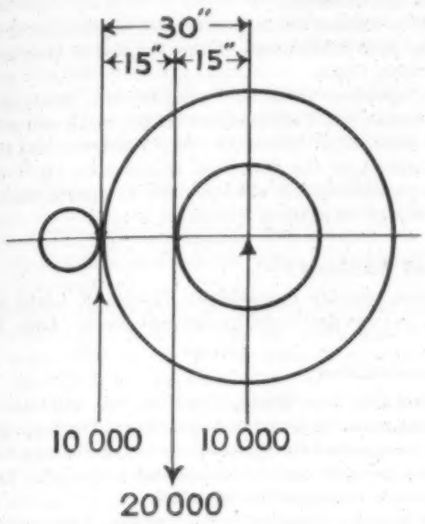


FIG. 1.

steel, and they are a feature that calls for the very best material of whatever kind, while a reasonable degree of liberality as to size is no objection. In this matter experience is a good guide, but if depending upon calculated results, a safety factor of about 10 should be used. The traction wheels for both trolley and bridge are best made of steel, or good chilled iron, the latter metal being preferred. They should be of heavy pattern, large diameter, with strong flanges on each

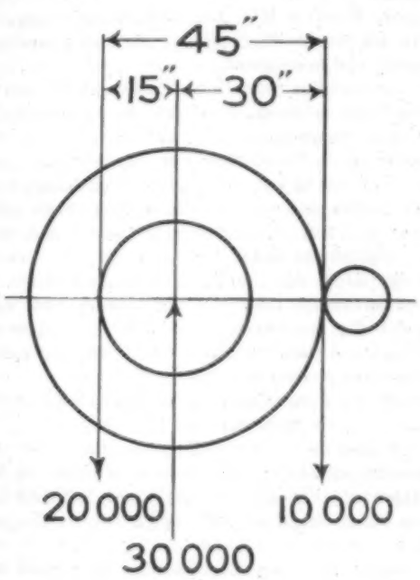


FIG. 2.

side, and run upon broad, flat headed rails. The driving gears are usually keyed direct to the hubs of the traction wheels, which latter are then provided with phosphor bronze bushings, and run upon fixed pins. This construction permits of a very efficient method of oiling through the axis of the pin. The simplest form of axle pin is merely a piece of round steel with a rectangular projection upon each end, fitting into a corresponding slot in a plate bolted to the trolley or bridge trucks, which holds the pin firmly against both rotary and endwise motion, admits of easy removal, and does not interfere with the method of lubrication above mentioned. Other methods of fixing the pins are by means of keys, set screws, bolts tapped into the joint, clamps in the form of caps, or regular capped bearings in which the axle is allowed to turn.

(Concluded in next issue.)

PERSONAL.

Thos. Parrock, of Youngstown, O., has resigned as district manager of the American Steel Hoop Co.

H. W. Surtees M. E., representing the Brunswick Malleable Iron & Steel Works at Derby, Eng., has been in the United States for the past two or three weeks, visiting various malleable castings plants.

John Oursler, who has had charge of the Mingo furnaces of the National Steel Co., succeeds Guy R. Johnson at the Youngstown furnaces of the company, the change taking effect Oct. 22. Mr. Johnson was presented with a gold watch by his associates at Youngstown, just before his departure for Duquesne.

Supt. W. E. Corey of the Homestead Steel Works of the Carnegie Steel Co., and manager of the Carrie blast furnaces, has been made manager of the Howard Axle Works, one of the properties of the Carnegie Co.

Edward W. Heyl, of the engineering firm of Heyl & Patterson, of Pittsburg, returned last week from a four months' sojourn in Europe. He went abroad to recover his health, which he has succeeded in doing, judging from outward appearances.

T. McLeod Muir, a member of the firm of J. & T. Muir, iron founders, of Melbourne, Australia, was in Pittsburg last week visiting foundries and steel plants.

Robert Field, of the pig iron firm of Stevenson, Field & Co., Columbus, O., was united in marriage last week at Cleveland to Mrs. Altha S. Schall.

Alfred E. Fairley, of Birmingham, one of the best known of English iron masters, was in Pittsburg last week.

Thomas B. Riter, of the Riter-Conley Mfg. Co., left Pittsburg for Sydney, Nova Scotia, last week, to attend the blowing in of the first of the furnaces of the Dominion Iron & Steel Co. This will be done early in November.

Suit Over Killeen and Bachman Metal Skimmers.

A patent infringement suit of interest to blast furnace owners and operators was begun last week in the United States Circuit Court for the Western District of New York at Buffalo. The Buffalo Furnace Co., of Buffalo, and Frank E. Bachman are made the defendants, and Michael Killeen, assistant superintendent of the Edgar Thomson furnaces of the Carnegie Steel Co., is the plaintiff. The patent at issue is on a metal skimmer for blast furnaces, designed by Mr. Killeen in 1898, and described in *The Iron Trade Review* of Nov. 16, 1899. The device, which is employed in connection with the tapping of metal from the blast furnace, provides a permanent metal trough, having a skimmer barrier, and a dam below the barrier or projecting above the trough bottom. The trough has a drain opening above the dam to tap off metal that is backed up by the dam. In the various runners are suitable shutters, or movable gates, which are employed to guide or control the stream of metal as desired. A skimming trough, which served the same purpose as the Killeen skimmer, but embodied other features and, according to the claims of the inventor obviated some of the difficulties attending those in use, was designed by F. E. Bachman, when manager of the Buffalo Furnace. It was described in *The Iron Trade Review* of Jan. 4, 1900. After its introduction at the Buffalo Furnace there was some correspondence between representatives of the two devices. The Buffalo skimmer, it was claimed, is not like the Killeen device and is not an infringement. Rights have been sold by the owners of both skimmers, to various blast furnace companies. The Buffalo Furnace Co. and Pickands, Mather & Co. are using the Bachman device, the latter company employing it at its West Middlesex, Pa., furnace.

The suit just instituted is for damages and permanent injunction.

The La Belle plant of the American Tin Plate Co., located at Wheeling, W. Va., will shortly be placed in operation after being shut down since July.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:

The Rock River Machine Co., succeeds the Taylor & Morris Co., of Janesville, Wis. The new company was recently incorporated with a capital of $15,000 and took over the property of the old company. Officers are as follows: R. H. Morris, president; George H. Marsden, vice-president; Frank B. Strickler, secretary and treasurer. In addition to carrying on the business of the old concern it will manufacture heavy shears, punches, etc.

The Columbus Pneumatic Tool Co., Columbus, O., has been granted a charter with a capital stock of $25,000. The company will make a variety of pneumatic tools, but will make a specialty of the "U. & W." piston air drill. The incorporators are: S. M. Dunlap, T. C. Dunlap, F. H. Plum, F. S. Morris and A. M. Steinfeld.

The Model Mfg. Co., Celina, O., has commenced operations with R. C. Taggart as manager. The concern will manufacture special machinery and gas and gasoline engines.

Capitalists of Philadelphia, Pa., have organized the Saxton Furnace Co. and will apply for a Pennsylvania charter.

The Mexico Jupiter Steel Co. has recently been organized with offices at Tampico, Mex. It has a capital stock of $500,000. Officers are: John M. Anderson, president; D. H. Pearsall, vice-president; L. T. Yoder, treasurer, and Charles S. Miller, assistant treasurer.

A. W. Morey has converted the factory of Bolton & Skillman, Lansingburgh, N. Y., into a machine shop.

The Moffett Metal Co., of Jersey City, N. J., was granted articles of incorporation last week. The company is capitalized at $125,000 and will manufacture and sell babbitt or antifriction metals. The incorporators are Frederick W. Moffett, W. A. Ross and W. E. Willard.

The Century Machine Co., of Portland, Me., was incorporated last week with a capital stock of $100,000. The incorporators are Charles Buchanon, Boston, Mass.; Charles F. Symonds, of Rockingham, Vt.

It is announced that the Chicago & Alton Railroad Co. will expend $300,000 during the next year on improvements at its shops located at Bloomington, Ill. The improvements will consist of the installation of a new power plant, heating and lighting plant, new car shops, the enlargement of several buildings and the fitting of the shops with up-to-date machinery.

The J. C. S. Mfg. Co., of Chicago, has been incorporated. Capital $5,000. It will do a general foundry and machine business. The incorporators are A. W. Bulkley, C. E. Moore and J. E. Owen.

The Western Engineering Co., Cleveland, was incorporated Oct. 12, by Wm. Russell, J. J. McCormick, G. C. Lucas, H. W. Lucas and Frank Yost. Capital $10,000.

The International Gas Engine Co., Englewood, N. J., was incorporated Oct. 12. Capital $200,000 Incorporators are: W. F. Timlow, G. H. Lewis, W. H. Robinson & J. H. Brewster, of Englewood, and N. S. Brinton, of New York.

The Vulcan Iron Works, Charleston, W. Va., has been incorporated. Capital $100,000. The company will operate a foundry, boiler shop, etc.

The Steam Boiler Equipment Co. of New York, New York City, capital $250,000, has been incorporated by O. F. Gleason, Arlington, N. J.; E. P. Gleason, E. H. Hovey, Brooklyn; W. J. Fanning, attorney, New York City.

The Akron Foundry Co., Akron, O., has been incorporated with a capital stock of $20,000. A site has been bought for extensions.

The L. J. Wing Mfg. Co., New York City, capital $30,000, has been incorporated to manufacture machinery. Directors: L. J. Wing, C. C. Davis, and R. S. Davis.

The Hanley Construction Co. has been incorporated under New Jersey laws. The new company will construct vessels and has a capital of $250,000. Incorporators: Lorenzo D. Baker, Lorenzo D. Baker, Jr., Reuben R. Baker, Charles C. Hanley, Elisha B. Hopkins, John S. Evans.

The International Motor Carriage Co., with offices in the Corporation Trust Co. Bldg., Jersey City, has been incorporated by Robert S. Rudd, Langdon Greenwood and Percy L. Klock to manufacture motor carriages. Capital $200,000.

The Cycloid Engine Co. has filed articles of incorporation at Augusta, Me. Capital $10,000. Charles S. Farquhar, of Boston, is president.

The Gardner Electric Drill & Machinery Co., recently incorporated at Denver, Col., with a capital of $1,000,000 is about to erect a mammoth plant for the manufacture of electric drills and hammers.

A plant to employ about 300 men will be established in New Haven by John Addlehurst, of the Bradley & Hubbard Mfg. Co., Meriden, Conn.

An independent sheet mill company will be organized by W. A. Thomas, Jas. Patterson and others, and a mill will probably be erected at Niles, O. Mr. Patterson was formerly superintendent of the Struthers Iron & Steel Co., Struthers, O. The outcome of the election will determine whether the project will go on at once.

Fires and Accidents:—

The iron foundry operated by Charles W. Leete, at Potsdam, N. Y., was destroyed by fire last week. Loss, $10,000.

New Construction;—

The Erie City Iron Works, Erie City, Pa., will immediately rebuild the machine shop recently destroyed by fire. Bids are already being asked for the construction of the new building, which will be much larger than the one destroyed. The most improved machinery will be installed.

The Allentown Foundry & Machine Co., Allentown, Pa., is enlarging its plant by the erection of an addition, 46x100 feet.

Aullman Bros., proprietors of the Eagle Iron Works, Des Moines, Ia., are figuring on some extensive improvements. They may be compelled to seek another site before additions and enlargements can be made.

Walter Pearson & Co., Whitman, Mass., are erecting an 18x53 feet addition to their machine shop.

The Michigan Heater Co., Big Rapids, Mich., has awarded the contract for its new foundry to Crookshank & Sauers, Ionia, Mich.

The Jenny Electric Mfg. Co., Indianapolis, Ind., advises us that in the event of President McKinley's reëlection it will probably add to its plant.

The Cleveland Hardware Co., Cleveland, O., will build a three-story brick addition, which will be an extension of its manufacturing departments.

The Pittsburg Hardware Mfg. Co., Scranton, Pa., will erect buildings and install equipments. The buildings will cover an area of 5 acres, and will be constructed of brick and stone, with slate roof and structural steel work, and will cost $175,000. Equipment will cost $50,000.

The Imperial Wheel Co., Flint, Mich., will build a three-story brick manufacturing building, 850x75 feet, dry kilns, engine and boiler houses, etc. Bids will be asked for soon.

The Keystone Agricultural Co., Pottstown, Pa., will build a foundry to make its own castings.

The Frankford Forge Co. has commenced work on the erection of its new plant at Eddystone, Pa.

Work will soon be commenced on the erection of the plant of the Bradford Steel Co., to be located at Bradford, Pa.

It is reported that the Pennsylvania Railroad Co. will enlarge its boiler shops at Juniata, Pa., by building a 150-ft. addition.

The Camden Smelting Co., Camden, N. J., will build an addition 24x26 feet.

The Atlas Engine Works, Indianapolis, Ind., is planning to erect an addition of two or three new buildings to its plant.

The Birdsell Wagon Mfg. Co., South Bend, Ind., is erecting an addition to its plant.

The Vulcan Iron Works, Des Moines, Iowa, is building a two-story brick foundry and machine shop, to occupy a ground space of 44 by 130 feet.

The Columbia Iron & Steel Foundry Co., Pittsburg, has let the contract for a 10-ton open-hearth furnace to Edward E. Erikson, Pittsburg.

The MacDonald Engineering Co., Chicago, has contracted with the Lake Shore & Michigan Southern Railway to build a steel elevator in Buffalo, with a capacity for 750,000 bushels.

The building will be finished by March, 1901, and will cost about $100,000. Power from Niagara Falls will be used.

The Pittsburg District:—

The Best Mfg. Co., of Pittsburg, has leased a large iron-clad building adjoining its present plant and will take possession of it in February 1901. Owing to the large amount of work on hand, the present quarters are considerably cramped.

Moorehead Bros., Sharpsburg, Pa., have closed down their plant for three weeks of repairs. Improvements will be made including two sets of rolls.

The Wisconsin Graphite Co. is being promoted at Pittsburg. The purpose of the new concern is to manufacture various products from the mineral which will be shipped from Portage County, Wis.

The American Ax & Tool Co., which is building a plant at Glassport, Pa, is making preparations to nearly double the size of the plant before its completion. The addition will be two stories, 715 feet long and 150 feet wide. The new plant will start up in February.

The Standard Gauge Steel Co. commenced suit in the United States Circuit Court, at Pittsburg, last week against Singer, Nimick & Co., alleging an infringement of a patent for dies and die holders for drawing steel rods.

Large plants along the Monongahela River that draw their water supply from the latter are suffering very much at the present time on account of the large percentage of sulphur in the water, which is playing havoc with boiler tubes. The sulphur comes from the mines along the river, and owing to the small amount of water in the channel at present the percentage of sulphur is above the usual.

Chicago District and Northwest:

The Rosenthal Husker Co., at present located at 35th and Walnut Sts., Milwaukee, Wis., and employing 50 men, will erect new works at North Greenfield, near Milwaukee, which will require a force of 200 men. A foundry for the manufacture of castings heretofore purchased, will be established.

The foundry of the Filer & Stowell Co., Milwaukee, Wis., will be widened 25 feet, at a cost of $100,000. Capacity will be increased 100 per cent.

The Chicago Hardware Mfg. Co., North Chicago, Ill., has lately had such a largely increased business that it has become necessary for it to add another building to its plant. It will be of brick, three stories high, covering a space of 40 by 75 feet. It will be used for a finishing department. The company also contemplates building an addition to its foundry within a short time.

The Moline Pattern & Mfg. Co. has succeeded to the business of the Moline Pattern & Machine Works at Moline, Ill. The officers of the new company are David A. Gamble, president; D. L. Adams, vice-president; George B. Buck, secretary and treasurer. The company makes patterns and novelty work, and manufactures churns and the Shortliff rotary engine.

The portions of the plant of the Wm. Bayley & Sons Co., of Milwaukee, Wis., which were recently destroyed by fire, will be rebuilt immediately. The principal damage was in the machine shop, the foundry and office buildings being uninjured. The drawings and designs of the company were not injured, being in the office, and this will aid materially in resuming active operations. The company makes architectural iron work and general machinery, and is also a large manufacturer of hot blast heating apparatus.

The Milwaukee Woven Wire Works, Milwaukee, Wis., has been incorporated with a capital stock of $25,000, by Charles Kemkel, F. C. Nieman and Henry Kelling.

The citizens of Waukegon, Wis., have offered the Marinette Iron Works Co., located at Marinette, Wis., free rent, light and heat for a period of ten years if the plant will be located in their city. The company is badly in need of larger quarters.

The organization of the Milwaukee Forge & Iron Co. will shortly be consummated. The capital stock will be $300,000. The new concern will manufacture shafting, piston rods and all kinds of steamboat machinery.

Forster, Waterbury & Co., 1200, 355 Dearborn St., Chicago, makers of malleable castings, will begin work at once on an extensive addition to their plant at Franklin Park, Ill. The improvements will include a foundry, 200x75 feet in size; a machine shop, 200x40 feet; a forge room, 60x100 feet; a rattle box room, 36x80 feet. All the buildings will be of brick, one story high. They will cost, with equipment, $50,000. Bids are now being received for the work.

The Creamery Package Mfg. Co., West Washington St., Chicago, will erect a foundry, 34x84 feet; a boiler house, 20x38 feet; a coal vault, 22x30 feet, at 1142 to 1158 West 16th St., Chicago. The improvements will cost $10,000.

General Industrial Notes:—

We are officially informed that there is no truth in the report that the Lorain Steel Co., Lorain, O., will build a rod mill.

The 10-inch mill of the American Steel Hoop Co. at Warren, O., has started up.

The Old Diamond Steel Works, Reading, Pa., has been purchased by Philadelphia business men, and will be known hereafter as the Philadelphia Steel Co. A specialty will be made of the manufacture of high grade crucible tools steels. Walter Steel, who built the works, will be superintendent of the new company, and Aaron I. Sanson, Jr., will be general manager and selling agent. The directors are: D. F. Vaughn, T. V. Parker, Aaron I. Sanson, Jr., Jas. O. David and D. F. Hallahan, the last named being also secretary. The company's headquarters will be in the Stephen Girard Building, Philadelphia.

A new tube mill, to be located in Zanesville, O., is being promoted by certain eastern capitalists. It is proposed to sell at par $200,000 worth of bonds, half to be taken by the people of Zanesville, and the other half to be disposed of in Boston by Chas. H. Twist and Harvey K. Flagler, two of those interested.

The Brooks Locomotive Works Dunkirk, N. Y., has orders for 20 locomotives for the Chicago, Rock Island & Pacific Railroad, and 5 locomotives for the Colorado Midland.

The Wolverine Stove Co. has been incorporated at Detroit, Mich., with a capital of $20,000.

The Michigan Safety Furnace Pipe Co., Detroit, Mich., has increased its capital $30,000.

The repairs to the Canton, O., plant of the American Sheet Steel Co. have been completed, and operations resumed.

The Aultman Co., Canton, O., has installed in their foundry a new overhead crane for conveying molten metal. Several core ovens have been built and general repairs made throughout the plant. The company has gone into the manufacture of ice machines. Recent shipments include a 40-ton charging machine to the Duquesne Steel Works, a rock crusher to central Mexico, threshing machinery to Illinois and Michigan, and conveying machinery to various points.

The Nordberg Mfg. Co., Milwaukee, Wis., will move into its new and larger buildings and will employ 1,000 men, about a third more than at present.

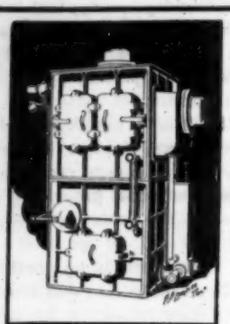
The Risdon Iron Works, San Francisco, Cal., are considering sites on the Hudson and on the New Jersey coast for the establishment of a shipbuilding plant. A New Jersey site will probably be chosen. The company now occupies 35 acres in San Francisco, and employs more than 2,500 men. It is the only formidable coast rival of the Union Iron Works, which built the Oregon. With its new plant the Risdon Iron Co. will be in a position to compete for the construction of government boats on both the Altantic and Pacific coasts.

Bids for pumps with a capacity of 12,000,000 gallons daily were opened by the director of public works of Pittsburg this week. Thirteen concerns received specifications, but only three furnished bids for the reason that the remainder were too busy with other work. The Wilson-Snyder Mfg. Co., of Pittsburg, bid $252,000; Henry R. Worthington, Brooklyn, N. Y., $218,500, and the Camden Iron Works Co., Camden, N. J., $237,500. Contracts have not yet been awarded.

The Whitaker Iron Works, located at Wheeling, W. Va., resumed operations this week after a shut down of several months.

Webster R. Balsinger, ordnance engineer of the Carnegie Steel Co., left this week for a two months' trip in Europe.

In the item in our issue of last week concerning the hammers Samuel Trethewey & Co., Ltd., of Pittsburg, are



COCHRANE HEATER

Solid Stream of Dollars!

Ever think how much of all the heat put into steam in order to get power out of an engine is wasted—thrown to the four winds?

Maybe 5% of the heat (and seldom is this exceeded) is converted into power by a non-condensing engine, and only something over 15% in the very best of the condensing engines. Just think of the stream of dollars that is constantly passing through an exhaust main because so little of the heat is used! If you do realize it you will make every effort to utilize some portion of your exhaust through a good feed-water heater.

With a **Cochrane Heater** you can make all the saving there is to be made, whether it is only in heating and purifying the feed-water, whether heating and purifying the feed-water and heating water for dye-house or other manufacturing purposes, or whether heating and purifying the feed-water, and providing a heating or drying system with exhaust steam as well.

One of these **Cochrane Heaters** makes the prettiest kind of an installation in a condensing plant, for the economizers, by passing their exhaust through this heater, can be made even more economical than the main engine run condensing.

The reasons are very plain that Heaters should be used. Now it comes down to which Heater to use, and right there you cannot afford to leave out of consideration the "**COCHRANES**," because these have all the "ear marks" and "hall marks" of the best Heater, that is built—plain, practical, commonsense, everyday appliances; substantial, free from repairs, durable.

Our catalogue (which may be had for the asking) is sure to interest you.

HARRISON SAFETY BOILER WORKS, Clearfield & 17th Streets, PHILADELPHIA, PA.

manufacturing for the working of tool steel, the sizes were incorrectly stated. They should have read, "from 400 pounds to 3,000 pounds."

The Montreal Rolling Mill Co., Montreal, Que., is considering the establishment of a plant at Sydney, C. B.

The United States Cast Iron Pipe & Foundry Co. has closed down three of the five pits of the Addyston, O., plant.

The West End Chain Works, located at Lebanon, Pa., has been awarded a large contract for heavy chain for shipment to Cuba.

The Forsyth Pattern Co., Youngstown, will furnish the patterns for the new billet and slab mill of the Republic Iron & Steel Co.'s Bessemer plant. The Lloyd Booth Co. will furnish the mill.

The furnace of the Youngstown Steel Co., Brier Hill, O., went out of blast last week, and will be relined. It has been in operation for the last three years.

The creditors of the insolvent Continental Iron Co. are making an effort to start the Niles, O., mill of the company, and hope to be successful as soon as the bankruptcy proceedings are disposed of.

The Sharon plate mill of the Republic Iron & Steel Co. will resume. The mill has been idle since July.

Locomotive and car building as rated by the *Railway Gazette* of Oct. 19 are as follows: The Schenectady Locomotive Works, 5 locomotives for the Florida East Coast Railroad; the Baldwin Locomotive Works, 32 locomotives for the Union Pacific Railroad, instead of 27 as formerly reported, 10 locomotives for the Toledo, St. Louis & Southwestern Railroad, and 5 locomotives for the Colorado Midland Railroad. The Chicago, Rock Island & Pacific Railroad will soon place an order for 20 locomotives. The American Car & Foundry Co. will build 500 hopper bottom cars for the Buffalo, Rochester & Pittsburg Railroad, 400 coal cars for the New York, New Haven & Hartford Railroad, 200 cars of 80,000 lbs. capacity for an individual coal company, 125 box cars for the Florence & Cripple Creek Railroad, and 100 coal cars for the Texas Midland Railroad; and it is reported that 100 box and 50 furniture cars have been ordered from the same company by the St. Louis & San Francisco Railroad. The Haskell & Barker Car Co. have an order for 50 freight cars from the Norfolk & Western Railroad. Bids on 1,000 freight cars, 600 to be box cars, are asked by the Pennsylvania Railroad, and on 100 refrigerator cars by Nelson, Morris & Co. Specifications for 600 hopper bottom coal cars are being prepared by the Atchison Topeka & Santa Fe Railroad. The Illinois Terminal Railroad is in the market for 50 coal cars.

The Youngstown plant of the National Tube Co. will resume operations in every department.

The Greer tin mill of the American Tin Plate Co., located at New Castle, Pa., resumed operations this week.

The strike at the Shenango furnace, Sharpsville, Pa., has resulted in several small-sized riots during the past week. Many shots were fired, it is alleged, by striking laborers at the men who were employed to take their places.

The wages of the puddlers employed by the Penn Iron Works, Lancaster, Pa., have been reduced from $4 to $3.50 per ton.

The Sharon Steel Co., Sharon, Pa., will build a railroad from the works at South Sharon to Leesburg, Mercer Co., where coal mines are operated by the company.

The Galion Drop Forge Co., Galion, O., has purchased the right to manufacture the two T. E. Smythe patent wrenches. The company now has the patent rights to manufacture and place on the market four different types of wrenches.

The members of the Amalgamated Association employed at the Ensley, Ala., plant of the Tennessee Coal, Iron & Railroad Co. went on a strike last week owing to the refusal of the company to recognize the association in the signing of the next year's scale.

The rebuilt Haselton furnace of the Republic Iron & Steel Co. at Younsgtown, O., will be blown in Nov. 5.

The Cohoes Business Men's Association, Cohoes, N. Y., last week decided to pay the taxes of the Peck Ax Co. for five years, provided the plant burned down last spring is rebuilt.

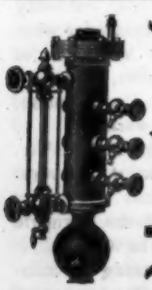
The Heston Valve & Supply Co., Camden, N. J., were granted articles of incorporation last week with a capital stock of $10,000.

It is reported that the necessary $100,000 capital for the iron ware factory promoted for Canandaigua, N. Y., has been pledged, and a company will be organized.

The Mary furnace of the Ohio Iron & Steel Co., located at Lowellville, O., went out of blast this week. The furnace has been piling iron for some time.

The open-hearth plant of the National Steel Co. at Sharon, Pa., resumed operations this week.

The new furnace of the Colorado Fuel & Iron Co., Pueblo,



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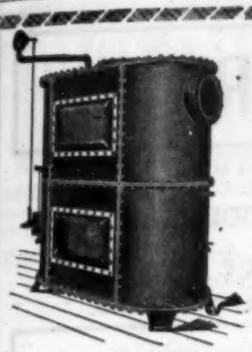

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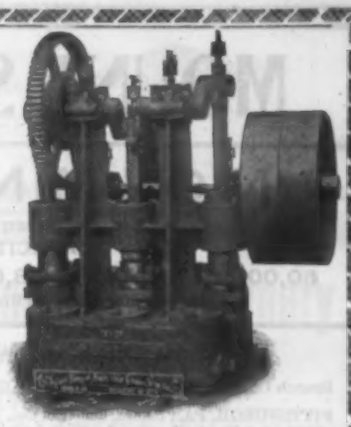

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Col., will be completed by March, 1900. This with other improvements in the steel mill will greatly increase the output. The company has recently completed 200 coke ovens and has 300 more building. Its steel trade has doubled in the last 30 days.

Fraser & Chalmers, of Chicago, have resumed the shipment of machinery to the Transvaal, which was interrupted nearly a year ago on account of the war.

THE LIFE OF STEEL CARS.

It is estimated by some that the life of steel cars as now built will be at least 20 years under ordinary conditions of service, whereas a certain French road expects to get from 50 to 60 years of service from small four-wheel metal cars when the painting is properly attended to. This latter estimate, by the way, is based upon a study of the condition of cars after 30 years of service. On the other hand, a few roads in placing orders have shown a preference for cars with steel underframes and wooden superstructure, fearing rapid corrosion of the metal parts if brought in contact with the lading.

As it has been suggested that the corrosion of metal underframes and tank plates of locomotive tenders should indicate what may be expected to happen with all-steel cars under very severe conditions, we have got information regarding the life of locomotive tenders from several of the principal roads, and this shows a pretty uniform experience. It is learned that, in addition to corrosion, the life of tanks is affected by the kind of water carried, the thickness of the plates and the bracing of the sheets. Side and back sheets, 3-16 and ¼ inch thick, and which are always well painted outside, are variously reported to last from 15 to 25 years. They usually fail first by cracking along the lower row of rivets, and the life of these sheets depends chiefly upon how well they are braced to resist the forces set up by the surging of the water in the tank. Bottom tank sheets, ¼ inch thick, and resting on the frames, are generally said to last from 10 to 15 years, in which case they fail by corrosion; but one road reports from 5 to 7 years, failure being due in that case to the fastenings becoming loose, so that the bottom plates wear by working on the frames. The top tank sheet, ¼ inch thick, is often in contact with the wet coal, and is also used as a place to store tool boxes, coupling links, etc., which tend to wear the plates. One road states that top sheets have to be renewed in from three to five years, while others generally agree on from eight to 10 years, this sheet failing by corrosion on the outside. The life of ¼-inch plates surrounding the coal space is variously given as short as three and as long as 12 years, but an average would appear to be from six to eight years. The side plates tend to bend along a line near the bottom, and possibly this action hastens corrosion. The first failures occur near the bottom of the side sheets, and the corrosion is on the side next the coal space. These plates seem to be little affected by corrosion on the water side. Metal underframes made of channels are estimated to last from 25 to 30 years under ordinary service conditions, and several state that the frames are cleaned and painted each time the locomotive undergoes general repairs. Wooden tender frames are said to last seven and eight years.

The experience with small metal cars on the Eastern Railroad of France, previously referred to, would lead to conclusions quite different from any that might be drawn from what we have gathered from the life of tenders. The condition of different kinds of metal coal and coke cars was investigated in 1896 by Mr. L. Tolmer, and reported that year at length in the *Revue Générale* for May. Metal car construction was adopted by the Eastern Railroad in 1861, so that the cars examined had been in service from 20 to 40 years. They vary in length from about 16 to 23 feet, have two axles and a capacity of about 10 tons. It is plain that more attention is

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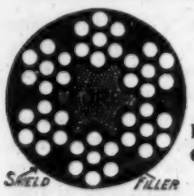

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given to painting and repairing cars, and the service is much less severe than in this country, as is evidenced by the statement that wooden coal and coke cars in France have a life of from 30 to 40 years. The loss by corrosion of the steel cars was obtained by taking apart cars of the several kinds and comparing the weights and sections of the members with the weights and sizes when new.

Cars 34 years old, having the upperframe work alone of metal, are first mentioned. The metal upperframes had lost 6 04 per cent by weight, and as the corrosion occurred at points where it greatly affected the strength, the iron work then required renewal to keep the cars in service, and such construction is not favored. When the cars with combination metal and wood underframes and metal upperframes were examined, they were 30 years old. The I-beam sills had lost 3.35 per cent of the original weight chiefly from the inner surfaces and surfaces so covered by other parts that they were seldom painted. The strength of the sills was not seriously affected. The metal upperframes lost 4.32 per cent, the greatest corrosion being where metal was inside the box or where it was covered by wood. The gusset plates joining the end and longitudinal sills had to be replaced repeatedly, and about 15 per cent of the rivets were in doubtful condition. It was thought these iron sills would show a life of 50 or 60 years, and the metal upperframe 45 to 50 years with slight renewals.

Cars with iron underframes and iron upperframes had been in service 20 and 26 years when inspected. The underframes of the first class had lost 3.18 per cent in weight, and the second lost 6 per cent. The loss of weight from the upperframes on cars 20 years in service was 5 per cent. The 5-16 inch gusset plates lost 18 per cent., and had to be renewed. The metal of the framing inside the box and that covered by other parts showed the greatest corrosion. With slight renewals these cars were expected to give 50 years' service.

Cars with underframes upperframes and sides and ends of metal were 21 years old when examined. The underframes had lost about 4 per cent, the iron side and plates only 1.8 per cent. but the framing of the box which was of light sections and covered by the plates had lost 12.5 per cent. The excessive loss of weight in the upper framing when iron side plates were used,

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compared to that when the sides and ends were wood, is accounted for by the fact that the wooden parts have to be renewed at rather frequent intervals, affording an opportunity to clean and paint the framing. It was thought that the iron upperframe of such cars would require renewal at the end of 20 years, and also that 35 per cent of the rivets having heads on the inside of the box would have to be replaced each time the cars underwent heavy repairs.

From this short summary of the results of Mr. Tolmer's study, it appears that the plates forming the sides of the box are not so subject to corrosion as experience with locomotive tenders in this country indicates, and further that the life of those metal cars is about double that of wooden cars. He also points out the importance of painting metal cars about once every three years; of using machine driven rivets which fill the holes better than hand rivets, and of using heavy sections in framing the superstructure. As stated before, what is said here cannot be considered conclusive. The life of steel plates used in cars may be longer than when used on locomotive tenders, and, on the other hand, the French cars are so much smaller and subject to so much lighter service that their performance may or may not be of much value in this country. So far as they go, however, Mr. Tolmer's investigations are very encouraging as to the future of the all-steel car.—[Railroad Gazette.

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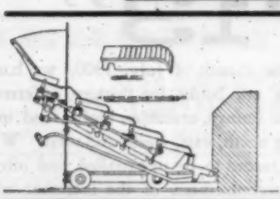

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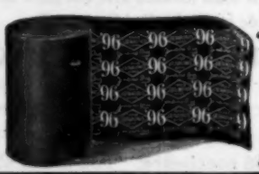

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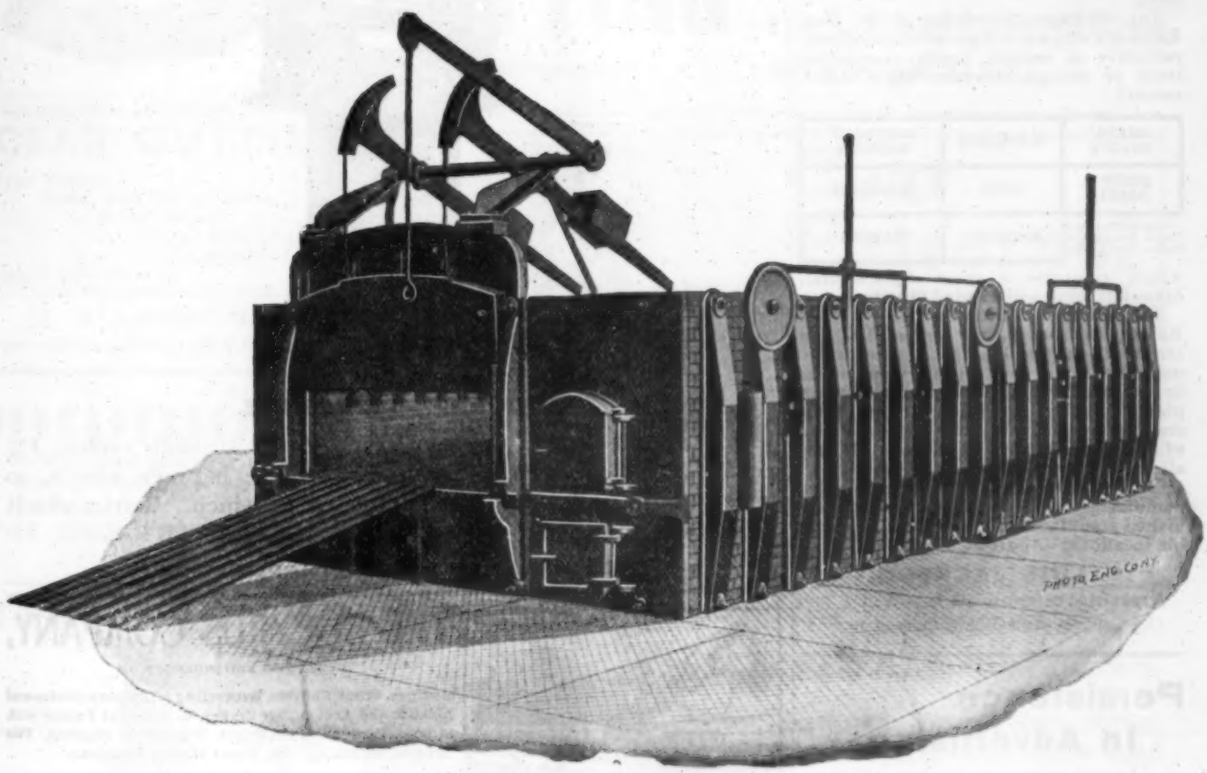

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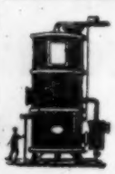

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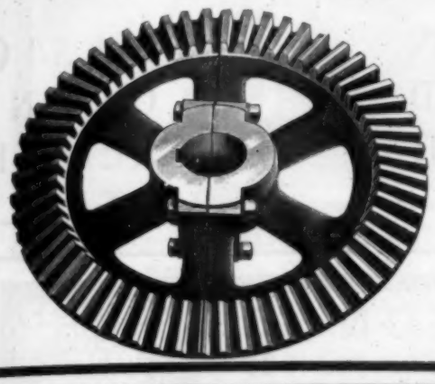

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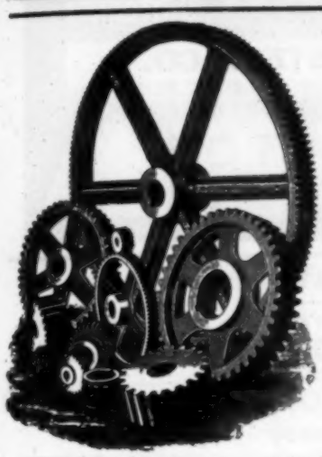

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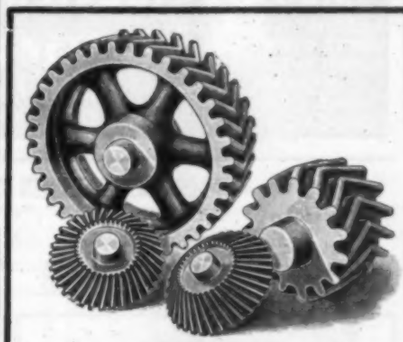

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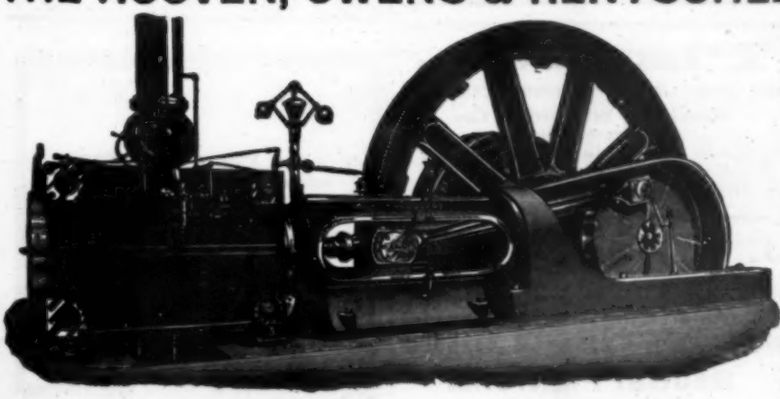

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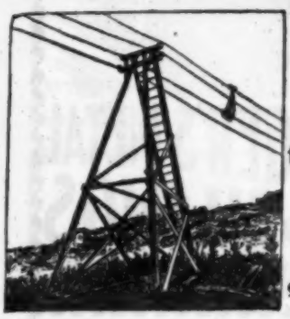

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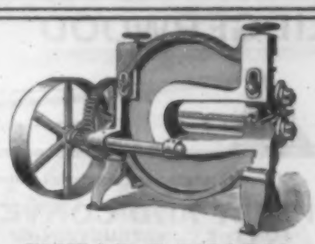

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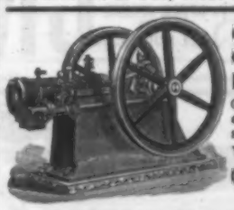

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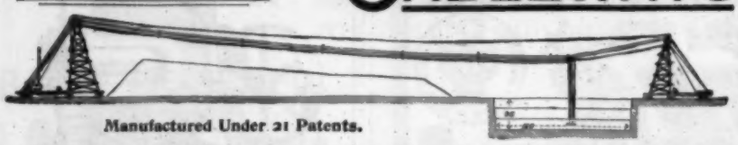

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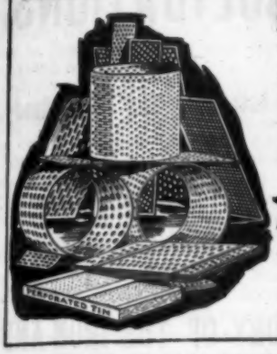

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"In March last we presented to the American Iron Trade a descriptive list of the consolidations of iron and steel companies which had taken place in the United States since January 1, 1898, twenty-three in all. We now present to the trade a more complete list of iron and steel consolidations, embracing those organized since March as well as those previously described, *numbering thirty in all*, the information relating to each consolidated company being revised and verified down to August 15. We have confined the list of consolidations to those which embrace the ownership of blast furnaces, rolling mills, steel works, tinplate works, and auxiliary industries, including shipbuilding and bridgebuilding works. Only companies that have been consolidated since January 1, 1898, are described in this volume, which is a Supplement to the last edition of our Directory to the Iron and Steel Works of the United States. *A new edition of the Directory cannot be printed this year.*

"The present edition of the Supplement comprises 78 well printed pages and contains an authorized description of the organization of each of the thirty consolidations mentioned, giving its capitalization, list of officers, general office address and address in most instances of the district offices, and a list of properties owned or operated by it, with the names of previous owners of iron and steel works. The name and the character of every plant are fully stated. For detailed information concerning the plants mentioned and their products reference is given to the page or pages in the Directory in which they are fully described. Iron ore mines, coal mines, coke ovens, railroads, and lake vessels owned by the consolidated companies are also given in sufficient detail."

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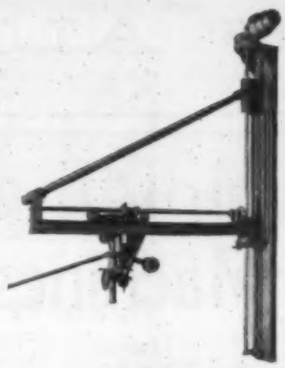

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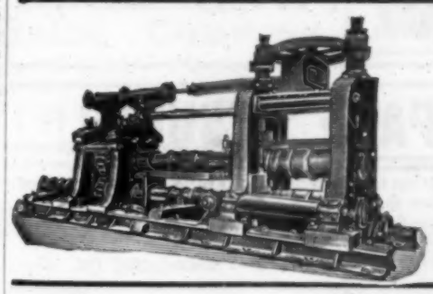

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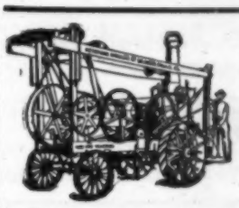

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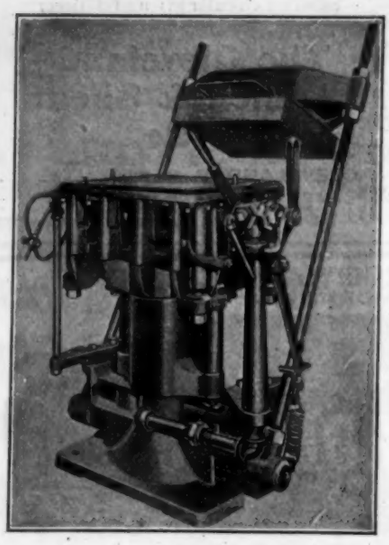

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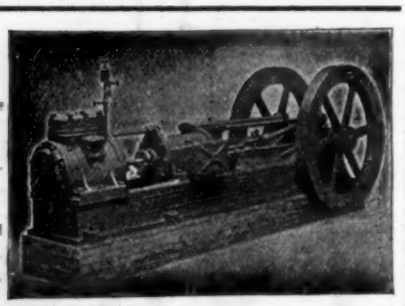

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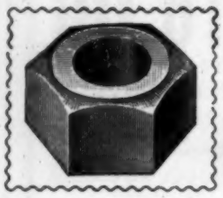

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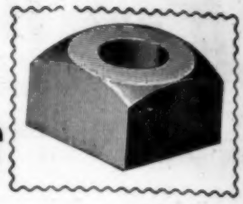

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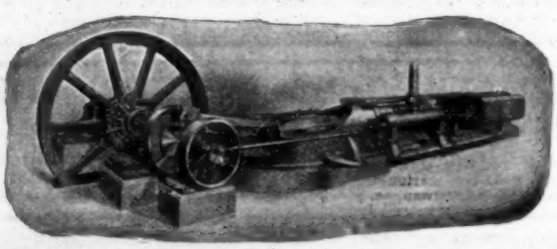

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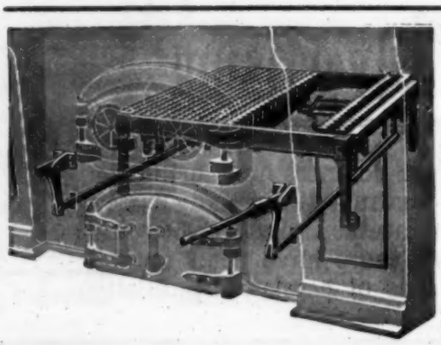

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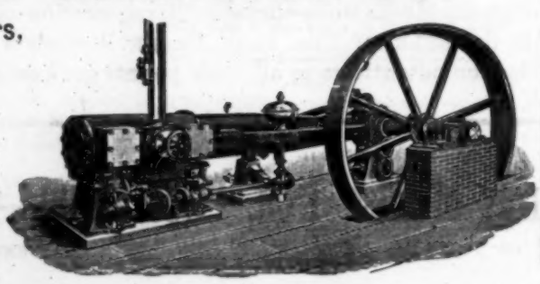

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J. V. Rose, Sharon, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
F. B. Holmes & Co., Detroit, Mich.
A. J. Haws & Son, Johnstown, Pa.
Webster Foundry Sand Co., Philadelphia, Pa.
Scioto Fire Brick Co., Sciotoville, O.
Newport Sand Bank Co., Newport Ky.
Crown Fire Clay Co., Akron, O.

FRICTION METAL—
Theo. Hiertz & Son, St. Louis, Mo.
C. H. Besly & Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
J. J. Ryan & Co., Chicago, Ill.

FURNACE LININGS—
Union Mining Co., Mt. Savage, Md.

FUEL OIL BURNERS—
Rockwell Engineering Co., New York City.

GALVANIZED IRON—
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.

GALVANIZERS—
American Sheet Steel Co., New York City.

GALVANIZING POTS—
The Wm. B. Pollock Co., Youngstown, O.

GAS ENGINES—
Northern Engineering Works, Detroit, Mich.
Columbus Machine Co., Columbus, O.
Atlas Machine Co., Pittsburg, Pa.

GAUGE COCKS—
James Bonar & Co., Pittsburg, Pa.

GEARING—
I. & R. Greenwald Co., Cincinnati, O.
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.
Fraser & Chalmers, Chicago, Ill.
Southwark Foundry & Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
Link Belt Machinery Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

GEAR CUTTERS—
F. H. Bultman & Co., Cleveland, O.

GEAR CUTTING—
The R. D. Nuttall Co., Allegheny, Pa.
The Van Dorn & Dutton Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.

GEAR LUBRICANTS—
The Ironsides Company, Columbus, O.

GIRDER WORK—
Wm. B. Scaife & Sons, Pittsburg, Pa.

GRINDSTONES—
C. H. Besly & Co., Chicago, Ill.

GRAPHITE PAINT—
Jos Dixon Crucible Co., Jersey City, N. J.

GRATE BARS—
Geo. B. Sennett Co., Youngstown, Ohio.

HACK SAWS—
Cleveland Punch & Shear Wks. Co., Cleveland, O

HANGERS—
E. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
I. & R. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co. Chicago, Ill.

HARNESS SNAPS—
Covert Mfg. Co., West Troy, N. Y.

HEATERS AND PURIFIERS—
Harrison Safety Boiler Works, Philadelphia.
James Bonar & Co., Pittsburg, Pa.
Wefugo Co., Cincinnati, O.
The United Boiler Co., Girard, O

HEAVY HARDWARE—
C. H Besly & Co., Chicago, Ill.

HOISTS—
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.

HOISTING ENGINES—
The Edward P. Allis Co., Milwaukee, Wis.
Lidgerwood Mfg. Co., New York City.
Exeter Machine Works, Pittston, Pa.
The Aultman Co., Canton, O.
Webster, Camp & Lane Machine Co., Akron, O.
Vulcan Iron Works, Wilkes-Barre, Pa.

HOISTING MACHINERY—
Exeter Machine Works, Pittston, Pa.
Link-Belt Machinery Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
The Aultman Co., Canton, O.
The Brown Hoisting and Conveying Machine Co., Cleveland, O.
Webster, Camp & Lane Machine Co., Akron, O.
A. Leschen & Sons Rope Co., St. Louis, Mo.

HOISTING ROPE (WIRE)—
American Steel & Wire Co., Chicago, Ill.

HORSE SHOES—
Phoenix Horse Shoe Co., Joliet, Ill
American Steel & Wire Co., Chicago, Ill.

INDUSTRIAL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

INGOT MOLDS—
Lorain Foundry Co., Lorain, O.

INJECTORS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

INSURANCE COMPANIES—
Hartford Steam Boiler I. & I. Co., Hartford, Ct.

IRON BUILDINGS—
Illinois Steel Co., Chicago, Ill.
Riter-Conley Co., Pittsburg, Pa.
Wm. B. Scaife & Sons, Pittsburg, Pa.
American Bridge Co., New York City.

IRON, NAILS AND STEEL—
C. H. Besly & Co., Chicago, Ill.

IRON AND STEEL ROOFING—
Berger Mfg. Co., Canton, O.
Wm. B. Scaife & Sons, Pittsburg, Pa.
McCullough Iron Co., Wilmington, Del.

IRON ORE—
Lake Superior Consolidated Iron Mines New York City, N. Y.
Oglebay, Norton & Co., Cleveland, O.
Pickands, Brown & Co., Chicago, Ill.
M. A. Hanna & Co. Cleveland, O.
Drake Bartow & Co., Cleveland, O.
Pickands, Mather & Co., Cleveland, O.
J. Wesley Pullman, Philadelphia, Pa.
Tod, Stambaugh & Co., Cleveland, O.
Jerome Keeley & Co., Philadelphia, Pa.

IRON WORKING MACHINERY—
Atlas Machine Co., Pittsburg, Pa.

IRON WORKING TOOLS—
Avery Stamping Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Armstrong Bros. Tool Co., Chicago, Ill.
F. H. Bultman & Co., Cleveland, O.
The Armstrong Mfg. Co., Bridgeport, Conn.
Bickford Drill & Tool Co., Cincinnati, O.
Bertsch & Co., Cambridge City, Ind.
Thos. P. Conard, Philadelphia, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
Carlin Machinery & Supply Co., Allegheny, Pa.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Jos. E. Bissell, Agt. Prentiss Tool & Supply Co. Pittsburg, Pa.
Springfield Machine Tool Co., Springfield, O.

LADLES—
Northern Engineering Works, Detroit, Mich.
The United Boiler Co., Girard, O.
Wm. B. Pollock Co., Youngstown, O.
Whiting Foundry Equipment Co., Harvey, Ill.

LAG SCREWS—
Vulcanus Forging Co., Cleveland, O.

LATHES—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.
Springfield Machine Tool Co., Springfield, O.
Joseph E. Bissell, Agt. Prentiss Tool & Supply Co., Pittsburg, Pa.

LATHE TOOLS—
Armstrong Bros. Tool Co., Chicago, Ill.

LINK BELTING—
The Jeffrey Mfg. Co., Columbus, O.
Link-Belt Machinery Co., Chicago, Ill.
The Aultman Co., Canton, O.

LOCOMOTIVES—
Hyde Bros. & Co., Pittsburg, Pa.

LUBRICANTS—
The Ironsides Co., Columbus, O.

MACHINE TOOLS—
H. Bickford, Lakeport, N. H.
C. H. Besly & Co., Chicago, Ill.
U. Baird Machinery Co., Pittsburg, Pa.
Bertsch & Co., Cambridge City, Ind.
Armstrong Bros. Tool Co., Chicago, Ill.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O.
F. H. Bultman & Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Carlin Machinery & Supply Co., Allegheny, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Pelton Engineering Co., Cleveland, O.
Atlas Machine Co., Pittsburg, Pa.
J. V. Burke, Chicago, Ill.
Joseph E. Bissell, Agt. Prentiss Tool & Supply Co., Pittsburg, Pa.
Springfield Machine Tool Co., Springfield, O.

MACHINE SCREWS—
C. H. Besly & Co., Chicago, Ill.

MACHINERY AND TOOL STEEL—
C. H. Besly & Co., Chicago, Ill.
Crescent Steel Co., Pittsburg, Pa.
Byron H. White, Chicago, Ill.
Morris & Bailey Steel Co., Pittsburg, Pa.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.

MAGNESIA COVERING—
C. H. Besly & Co., Chicago, Ill.

MALLEABLE CASTINGS—
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
Link Belt Machinery Co., Chicago, Ill.
Meadville Malleable Iron Co., Meadville, Pa.

MANILLA ROPE—
A. Leschen & Sons Rope Co., St. Louis, Mo.

MANILLA ROPE COATING—
The Ironsides Co., Columbus, O.

MANUFACTURING CHEMISTS—
Wefugo Co., Cincinnati, O.
Grasselli Chemical Co., Cleveland, O.

MECHANICAL STOKERS—
Century Machine & Mfg. Co., Mansfield, O.

METAL BEARINGS—
Theo. Hiertz & Son, St. Louis, Mo.
C. H. Besly & Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
J. J. Ryan & Co., Chicago, Ill.

METAL CEILINGS—
Berger Manufacturing Co., Canton, O.

METALLIC TUBING—
Sharp, Klumph & Sission Co., Chicago, Ill.

METAL WORK—
Avery Stamping Co., Cleveland, O.

MILL CASTINGS—
Schuykill Iron & Steel Co., Philadelphia, Pa.
A. Garrison Foundry Co., Pittsburg, Pa.

MILLING MACHINES—
U. Baird Machinery Co., Pittsburg, Pa.
Danielson Machine & Tool Co., Cleveland, O.

MINING MACHINERY—
C. H. Besly & Co., Chicago, Ill.
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
Lidgerwood Mfg. Co., New York City.
Exeter Machine Works, Pittson, Pa.
Wm. Cramp & Sons, Philadelphia, Pa
The Bucyrus Co., South Milwaukee, Wis.
Marion Steam Shovel Co., Marion, O.
Webster, Camp & Lane Machine Co., Akron, O
Fraser & Chalmers, Chicago, Ill.
Wm. B. Pollock Co., Youngstown, O.
Link Belt Machinery Co., Chicago, Ill.
Thew Automatic Shovel Co., Lorain, O.
A. Leschen & Sons Rope Co., St. Louis, Mo.
Carlin Machinery & Supply Co., Allegheny, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

MINE PUMPS—
F. M. Prescott Steam Pump Co. Milwaukee, Wis
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

MOLDING MACHINES—
Tabor Mfg. Co., Elizabeth, N. J.
Thos. Furlow & Son, Philadelphia, Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

MOLDING SAND—
Ohio Sand Co., Conneaut, O.
F. B. Stevens, Detroit, Mich.
Garden City Sand Co., Chicago, Ill.
Webster Foundry Sand Co., Philadelphia, Pa.
Newport Sand Bank Co., Newport, Ky

MULTIPLE DRILLS—
Bickford Drill and Tool Co., Cincinnati, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Jos. E. Bissell, Agt. Prentiss Tool & Supply Co. Pittsburg, Pa.

NICKEL PLATING OUTFITS—
Northampton Emery Wheel Co., Chicago, Ill.

NUTS (Self-Locking)—
National Elastic Nut Co., Milwaukee, Wis.

NUTS AND BOLTS—
Upson Nut Co., Cleveland, O.
National Elastic Nut Co., Milwaukee, Wis.
Milton Manufacturing Co., Milton, Pa.

OILLESS BEARINGS—
C. H. Besly & Co., Chicago, Ill.

OIL BURNERS—
Rockwell Engineering Co., New York City.

OIL CUPS—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

OIL FILTERS—
James Bonar & Co., Pittsburg, Pa.

OIL PUMPS—
C. H. Besly & Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
James Bonar & Co., Pittsburg, Pa.

OIL STORAGE TANKS—
Wm. B. Pollock Co., Youngstown, O.

OIL SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.

OIL TANKS AND CARS—
Wm. B. Pollock Co., Youngstown, O.

ORE CARS—
The Pressed Steel Car Co. Pittsburg, Pa.

ORE CRUSHERS—
The Edward P. Allis Co., Milwaukee, Wis.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers Chicago, Ill.

ORE HANDLING MACHINERY—
A. Leschen & Sons Rope Co., St. Louis, Mo.

ORE SCREENS—
Rob't Aitchison Per. Metal Co., Chicago, Ill.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
Western Machinery & Supply Co., Chicago, Ill.

ORE TESTING MACHINERY—
Keystone Driller Co., Beaver Falls, Pa.

PACKING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.
A. Leschen & Sons Rope Co., St. Louis, Mo.

PAINT—
Iron Clad Paint Co., Cleveland, O.
Jos. Dixon Crucible Co., Jersey City, N. J.
The Ironsides Co., Columbus, O.

PATENT ATTORNEYS—
Wm. N. Cromwell, Washington, D. C.

PATTERN WORKS—
Gobeille Pattern Co., Cleveland O.
Forsythe Pattern Works, Youngstown, O.
C. Birnbaum, Cleveland, O.
Buffalo Gear and Pattern Works, Buffalo, N. Y.
Balkwill Pattern Works, Cleveland, O.
Mt. Vernon Pattern & Model Works, Mt. Vernon, O.

PERFORATED METALS—
Aitchison Perforated Metal Co., Chicago, Ill.
Fraser & Chalmers, Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Western Machinery & Supply Co., Chicago, Ill.

PIG IRON—
Cabeen Co., Philadelphia, Pa.
Rogers, Brown & Co., Cincinnati, O.
Reed F. Blair & Co., Pittsburg, Pa.
Clinton Iron & Steel Co., Pittsburg.
Bourne-Fuller Co. Cleveland, O.
M. A. Hanna & Co., Cleveland, O
Pickands, Brown & Co., Chicago, Ill
F. B. Stevens, Detroit, Mich.
McKeefrey & Co., Leetonia, O.
Superior Charcoal Iron Co., Grand Rapids, Mich
Spearman Iron Co., Sharpsville, Pa.
Hickman, Williams & Co., Chicago, Ill,
Pickands, Mather & Co., Cleveland, O.
Republic Iron & Steel Co., Chicago, Ill.
American Steel Hoop Co., Pittsburg, Pa.
J. H. Hillman & Son, Pittsburg, Pa.
C. R. Baird & Co., Philadelphia, Pa.
Pilling & Crane, Philadelphia, Pa.
Sloss Sheffield Steel & Iron Co. Birmingham, Ala
Cherry Valley Iron Co., Pittsburg, Pa.
Jerome Keeley & Co., Philadelphia, Pa.
American Steel & Wire Co., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

PIPE (CAST IRON)—
Massillon Iron & Steel Co., Chicago, Ill.

PIPE (RIVETED STEEL)—
Wm. B. Scaife & Sons. Pittsburg, Pa.
Wm. B. Pollock Co., Youngstown, O.

PIPE COVERING—
C. H. Besly & Co., Chicago, Ill.
Jenkins Bros., New York City.

PIPE CUTTING AND THREADING MACHINES—
The Armstrong Mfg. Co., Bridgeport, Conn

PISTON RODS—
Bethlehem Steel Co., So. Bethlehem, Pa.

PLANERS—
U. Baird Machinery Co., Pittsburg, Pa.
Bickford Drill & Tool Co., Cincinnati, O.
Danielson Machine & Tool Co., Cleveland, O
Atlas Machine Co., Pittsburg, Pa.
Springfield Machine Tool Co., Sprinfield, O.

PLANER TOOLS—
Armstrong Bros. Tool Co., Chicago, Ill.

PLANISHED IRON—
American Sheet Steel Co., New York City.

PLATES—
Enterprise Boiler Co., Youngstown, O.
Republic Iron & Steel Co., Chcago, Ill.
Illinois Steel Co., Chicago, Ill.
American Steel & Wire Co., Chicago, Ill.

PLUMBERS' AND GAS FITTERS' SUPPLIES—
C. H. Besly & Co , Chicago, Ill.

PNEUMATIC APPLIANCES—
Clayton Air Compressor Works, New York.
W. J. Schaefer & Co., New York City.

PORTABLE FORGE—
C. H. Besly & Co., Chicago, Ill.
Vulcan Mfg. Co., Pittsburg, Pa.

POWER PRESSES—
Avery Stamping Co., Cleveland, O.
Bertsch & Co., Cambridge City, Ind.
Cleveland Punch & Shear Wks. Co., Cleveland, C.
H. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Bethlehem F'dry & Mach. Co. S. Bethlehem, Pa.

POWER TRANSMISSON MACHINERY—
Jeffrey Mfg. Co., Columbus, O.
R. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
I. & R. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co., Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

PRESSES—
Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago, Ill.
H. Konigslow & Bro. Cleveland, O.
Danielson Machine & Tool Co., Cleveland, O.
Avery Stamping Co., Cleveland, O.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Atlas Machine Co., Pittsburg, Pa.
Jos. R. Bissell, Agt. Prentiss Tool & Supply Co. Pittsburg, Pa.

PRESSURE GAUGES—
The Bristol Co., Waterbury, Conn.
James Bonar & Co., Pittsburg, Pa.

PULLEYS—
W. A. Jones Foundry Co., Chicago, Ill
R. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
I. & R. Greenwald Co., Cincinnati, O.
Link Belt Machinery Co., Chicago, Ill.
A. Leschen & Sons Rope Co., St. Louis, Mo.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.

PUMPS (STEAM)—
The Edward P. Allis Co., Milwaukee, Wis
Blakeslee Mfg. Co., Du Quoin, Ill.
James Bonar & Co., Pittsburg, Pa.
Fred M. Prescott Steam Pump Co., Milwaukee Wis.
Hall Steam Pump Co., Pittsburg, Pa.
Southwark Foundry & Machine Co., Philadelph'a, Pa.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
The Deming Co., Salem, O.

PUNCHES—
H. Konigslow & Bro. Cleveland, O.

PYROMETERS—
Edward Brown, Philadelphia, Pa.
Vulcan Mfg. Co., Pittsburg, Pa.

RADIAL DRILLS—
Bickford Drill and Tool Co., Cincinnati, O.
Jos. R. Bissell, Agt. Prentiss Tool & Supply Co. Pittsburg, Pa.

RAILS—
Hyde Bros. & Co., Pittsburg, Pa.
American Steel Hoop Co., New York City.

RAILWAY SUPPLIES—
Cleveland City Forge & Iron Co., Cleveland, O.
Garden City Sand Co., Chicago, Ill.
Hyde Bros & Co., Pittsburg, Pa.

RELAYING RAILS—
Hyde Bros. & Co., Pittsburg, Pa.

RIVETS—
Champion Rivet Co., Cleveland, O.
Vulcanus Forging Co., Cleveland, O.

RIVETED STEEL PIPE—
The Wm. B. Pollock Co. Youngstown, O

ROCK DRILLS—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

ROLL FORGINGS—
Samuel Trethewey & Co., Pittsburg, Pa.
Frankford Steel & Forging Co., Philadelphia, Pa.

ROLLING MILL MACHINERY—
The United Boiler Co., Girard, O.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
The Lloyd Booth Co., Youngstown, O.
West Penn Foundry & Machine Co., Avonmore, Pa.
Frank-Kneeland Machine Co., Pittsburg, Pa.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O
A. Garrison Foundry Co., Pittsburg Pa.
Whiting Foundry Equipment Co., Harvey, Ill.

ROOFS—
Riter-Conley Mfg. Co., Pittsburg, Pa.
Wm. B. Scaife & Sons, Pittsburg, Pa.
McCullough Iron Co., Wilmington, Del.
American Bridge Co., New York City.

ROPE—
A. Leschen & Sons Rope Co., St. Louis, Mo.

ROPE AND CORDAGE—
Waterbury Rope Co., New York City.
Link Belt Machinery Co., Chicago, Ill.

SAFETY WATER COLUMNS—
James Bonar & Co., Pittsburg, Pa.

SAWS—
Peter Gerlach & Co., Cleveland, O

SCRAP IRON—
Hyde Bros. & Co., Pittsburg, Pa.
Illinois Steel Co., Chicago, Ill.

SCREENS FOR COAL, ORE, ETC.—
Robt. Aitchison Perforated Metal Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.
Fraser & Chalmers, Chicago, Ill.
Western Machinery & Supply Co., Chicago, Ill.

SCREWS—
C. H. Besly & Co., Chicago, Ill.
Upson Nut Co., Cleveland, O.
Chicago Screw Co., Chicago, Ill

SECOND-HAND MACHINERY—
Hyde Bros & Co., Pittsburg, Pa.
The Atlas Machine Co., Pittsburg, Pa.
The W. J. Carlin Co., Pittsburg, Pa.
C. C. Wormer Machinery Co., Detroit, Mich.
Carlin Machinery & Supply Co., Allegheny, Pa.
Pelton Engineering Co., Cleveland, O.
J. V. Burke, Chicago, Ill.
Jos. R. Bissell, Agt. Prentiss Tool & Supply Co, Pittsburg, Pa.

SEPARATORS—
Harrison Safety Boiler Works, Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.

SHAFTING—
R. A. Delano, Chicago, Ill.
Dodge Mfg. Co., Mishawaka, Ind.
Pittsimmons & Co., Cleveland, O.
The Aultman Co., Canton, O.
Atlantic Tube Co., Pittsburg, Pa.
Jeffrey Mfg. Co., Columbus, O.
I. & R. Greenwald Co., Cincinnati, O.
Bethlehem Steel Co., South Bethlehem, Pa.
American Steel & Wire Co., Chicago, Ill.
Link Belt Machinery Co., Chicago, Ill.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
Atlas Machine Co., Pittsburg, Pa.

SHEARING AND PUNCHING MACHINERY—
Bertsch & Co., Cambridge City, Ind.
Danielson Machine & Tool Co., Cleveland, O.
Cleveland Punch & Shear Wks. Co., Cleveland, O.
Bethlehem F'dry & Mach. Co., S. Bethlehem, Pa.
Jos. R. Bissell, Agt. Prentiss Tool & Supply Co. Pittsburg, Pa.

SHAPERS—
Atlas Machine Co., Pittsburg, Pa.
Springfield Machine Tool Co., Springfield, O.

SHEAR KNIVES—
Samuel Trethewey & Co., Pittsburg, Pa.

SHEET IRON AND STEEL—
Republic Iron & Steel Co., Chicago, Ill.
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.
American Steel & Wire Co., Chicago, Ill.

SHIP YARDS—
Wm. Cramp & Sons, Philadelphia, Pa.

SOLID STEEL SHEAR KNIVES—
Samuel Trethewey & Co., Pittsburg, Pa.

SPECIAL MACHINERY—
Cleveland Punch & Shear Wks. Co., Cleveland, O.
James Bonar & Co., Pittsburg, Pa.
Avery Stamping Co., Cleveland, O.
The Aultman Co., Canton, O.
Jeffrey Mfg. Co., Columbus, O.
H. Konigslow & Bro. Cleveland, O.
Wheeling Mold & Foundry Co., Wheeling, W. Va.
Danielson Machine & Tool Co., Cleveland, O
Enterprise Mfg. Co., Columbiana, O.
Century Machine & Mfg. Co., Mansfield, O.
Jos. R. Bissell, Agt. Prentiss Tool & Supply Co Pittsburg, Pa.

STACKS—
Wm. B. Scaife & Sons, Pittsburg, Pa.

STAND PIPES—
The Wm. B. Pollock Co., Youngstown, O.
The United Boiler Co., Girard, O.

STEAM BOILER INSPECTORS—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

STEAM PIPE AND BOILER COVERING—
C. H. Besly & Co., Chicago Ill.

STEAM PACKING—
C. H. Besly & Co., Chicago, Ill.

STEAM PUMPS—
Hall Steam Pump Co., Pittsburg, Pa.
Blakeslee Mfg. Co., Du Quoin, Ill.
Fred. M. Prescott Steam Pump Co., Milwaukee, Wis.
Edw. P. Allis Co., Milwaukee, Wis.
Southwark Foundry and Machine Co., Philadelphia, Pa.
James Bonar & Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vaile Co., Dayton, O.
The Deming Co., Salem, O.

STEAM SEPARATORS—
James Bonar & Co., Pittsburg, Pa.
Harrison Safety Boiler Works, Philadelphia, Pa.
Wright Manufacturing Co., Cleveland, O.

STEAM SHOVELS AND DREDGES—
Marion Steam Shovel Co., Marion, O
The Bucyrus Co., South Milwaukee, Wis.
The Thew Automatic Shovel Co., Lorain, O.

STEAM SPECIALTIES—
C. H. Besly & Co., Chicago, Ill.
James Bonar & Co., Pittsburg, Pa.

STEEL—
Otis Steel Co., Cleveland, O.
Cabeen Co., Philadelphia, Pa.
Champion Iron & Steel Co., Muskegon, Mich.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
The Morris & Bailey Steel Co., Pittsburg, Pa.
Byron H. White, Chicago, Ill.
Monongahela Iron & Steel Co., Pittsburg Pa.
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.
C. R. Baird & Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

STEEL BANDS—
American Steel Hoop Co., Pittsburg, Pa.
American Steel & Wire Co Chicago, Ill.

STEEL BLOOMS AND BILLETS—
American Steel & Wire Co. Chicago, Ill.
Cabeen Co., Philadelphia, Pa.
Champion Iron & Steel Co., Muskegon, Mich.
National Steel Co., Chicago. Ill.
Bethlehem Steel Co., South Bethlehem, Pa.
The Lorain Steel Co., Lorain, O.
American Steel Hoop Co., Pittsburg, Pa.
C. R. Baird & Co., Philadelphia, Pa.
Jerome Keeley & Co., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

STEEL CARS—
The Pressed Steel Car Co., Pittsburg, Pa.

STEEL CASTINGS—
Otis Steel Co., Cleveland, O
Bethlehem Steel Co., South Bethlehem, Pa.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.

STEEL CEILINGS—
Berger Manufacturing Co., Canton, O.

STEEL FRAME MILL BUILDINGS—
Wm. B. Scaife & Sons, Pittsburg, Pa.
American Bridge Co., New York City.

STEEL HOOPS—
American Steel Hoop Co., Pittsburg, Pa.
STEEL PLANTS—
The Wm. B. Pollock Co., Youngstown, O.
The Riter-Conley Co., Pittsburg, Pa.
STEEL SHEETS—
Republic Iron & Steel Co., Chicago, Ill.
American Sheet Steel Co., New York City.
McCullough Iron Co., Wilmington, Del.
American Steel & Wire Co., Chicago, Ill.
STOKERS—
Century Machine & Mfg. Co., Mansfield, O.
TANKS—
Enterprise Boiler Co., Youngstown, O.
Meehan Boiler & Construction Co., Lowellville O
Wm. B. Scaife & Sons, Pittsburg, Pa.
The Wm. B. Pollock Co., Youngstown, O.
Riter-Conley Mfg. Co., Pittsburg, Pa.
The Aultman Co., Canton, O.
The United Boiler Co., Girard, O.
TANK CARS—
The Wm. B. Pollock Co., Youngstown, O.
TESTING MACHINERY—
Keystone Driller Co., Beaver Falls, Pa.
TIN AND TERNE PLATES—
American Tin Plate Company, New York City.
Champion Iron & Steel Co., Muskegon, Mich.
TIN PLATE MACHINERY—
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.
West Penn Foundry & Machine Co., Avonmore, Pa
Lloyd Booth Co., Youngstown, O.
TOOL HOLDERS—
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TOOL STEEL—
C. H. Besly & Co., Chicago, Ill.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
Monongahela Iron & Steel Co., Pittsburg, Pa.
American Steel & Wire Co., Chicago, Ill.
TRAMWAYS—
A. Leschen & Sons Rope Co., St. Louis, Mo.
TRANSMISSION MACHINERY—
Link-Belt Machinery Co., Chicago, Ill.
W. A. Jones Foundry & Machine Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
Dodge Mfg. Co., Mishawaka, Ind.
The Aultman Co., Canton, O.
Brown Hoisting and Conveying Machine Co., Cleveland, Ohio.
TRANSMISSION ROPE (WIRE)—
American Steel & Wire Co., Chicago, Ill.
TROLLEY TRACKS—
Northern Engineering Works, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.
TROLLEY WIRES—
American Steel & Wire Co., Chicago, Ill.
TRUCKS—
Northern Engineering Works, Detroit, Mich.
TUBES—
National Tube Co., Pittsburg, Pa.
S. Fix' Sons, Cleveland, O.
Sharp, Klumph & Sisson Co., Chicago, Ill.
TUBE WELDING—
S. Fix Sons, Cleveland, O.
TUMBLERS—
Northern Engineering Works, Detroit, Mich.
Whiting Foundry Equipment Co., Harvey, Ill.
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Stilwell-Bierce & Smith Vaile Co., Dayton, O.
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Milton Manufacturing Co., Milton, Pa.
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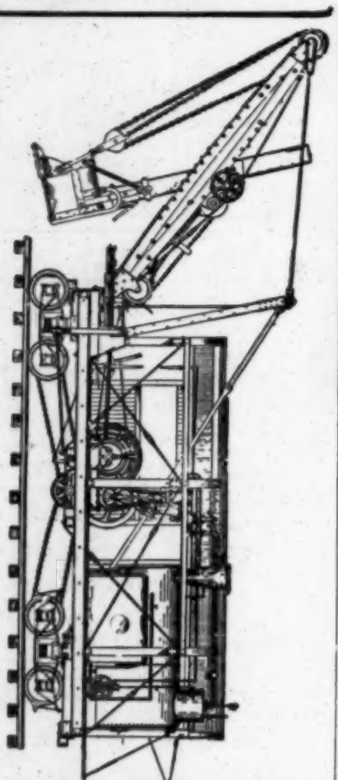

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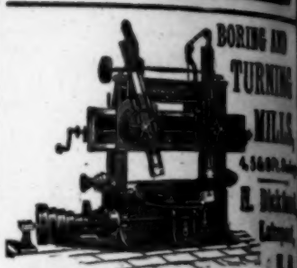

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